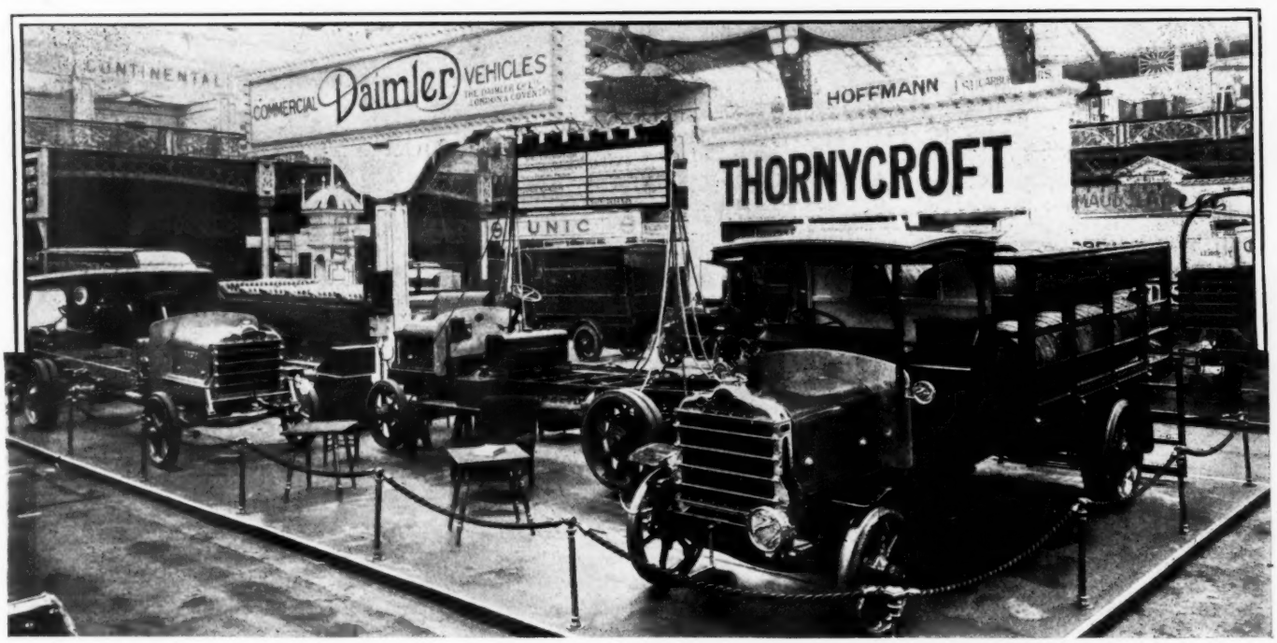
VOL. XXIX. NEW YORK—THURSDAY, AUGUST 7, 1913—CHICAGO No. 6

The AUTOMOBILE

British Commercial Show Opens



General view of the exhibition hall in which sixty-three firms are showing their wares

LONDON, ENGLAND, July 19—Yesterday morning at 11 a. m., H. R. H. Prince Arthur of Connaught performed the official opening ceremony in connection with the great Exhibition of Industrial Motor Vehicles which has been organized by the Society of Motor Manufacturers and Trades, that august body which controls every detail of the active life of the automobile industry and punishes with grave monetary penalties the least infraction of its multitudinous rules. Owing to the desire to reduce the number of shows to a minimum, it is several years since an exhibition of commercial vehicles has been held, and therefore particular interest is attached to the present display, while an additional feature is the attendance of the colonial delegates to the Imperial Motor Transport Committee—a body just called into existence for the purpose of insuring adequate organization of motor transport services in war.

There are nearly a hundred of these delegates assembled in London at present and their attendance at yesterday's opening ceremony did much to support the national character of the affair. A touch of humor was afforded by the sudden

Special to THE AUTOMOBILE

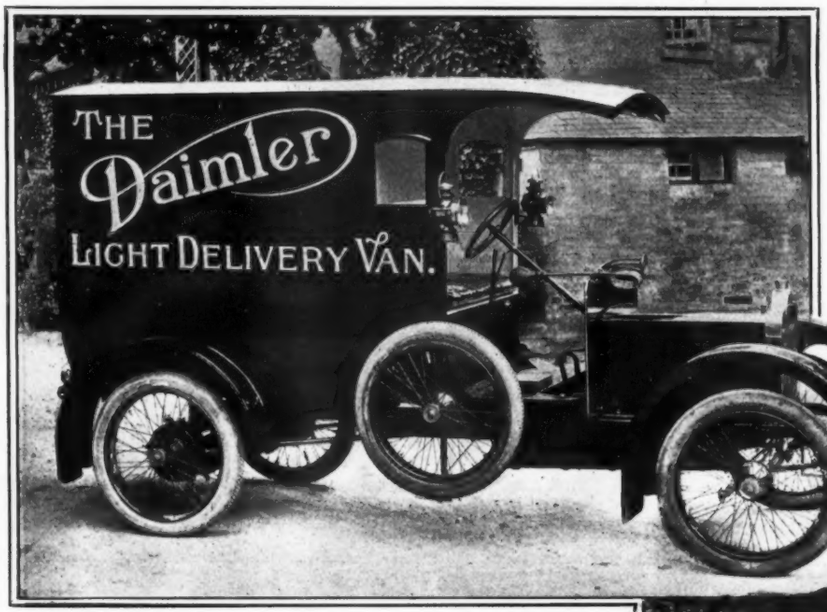
SHOW FACTS

¶*The show is held under the auspices of the Society of Motor Manufacturers and Traders, the British Body which coincides with the American Automobile Board of Trade.*

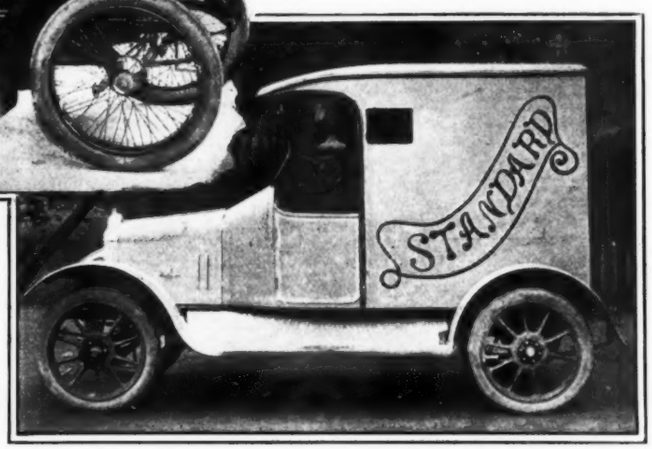
¶*Sixty-three exhibitors ranging from the manufacturers of the largest and heaviest types of commercial cars down to the makers of the lightest delivery cars are present.*

¶*Many Steam cars are exhibited but the electric type is entirely absent. One maker promises a vehicle of this type in the near future.*

¶*Many of the cars are equipped with the Knight engine and the London General Omnibus Co. has decided to use the Knight engine exclusively in its future trucks.*



The Daimler delivery wagon here shown is distinguished by the graceful lines of the chassis and the use of wire wheels for carrying the same. Attention is called to the unit power plant, from which an inclined shaft takes the drive to the rear wheels



The Standard delivery wagon is a very light construction and destined for delivery work of florists, milliners, etc. The interior of the body is accessible from the driver's seat, this method being used in loading and unloading. The vehicle is especially notable for its smart lines

and unexpected clearance of the building by the police just before the opening hour. Obviously afraid of some premeditated suffragette outrage, a large number of police officers lined up at one side of the hall and then proceeded quietly to eject every one in the place—whether official, standholder, or workman busy in completing the decorations. When the immense hall had been cleared, the legitimate occupants were allowed to re-enter on production of their official passes. The exhibitors were very wild about it all, but the police have had their nerves upset to such an extent of late by suffragette demonstrations that they have decided to take no risks in future.

It requires but a brief inspection of the show to force home the impression that this is by far the most representative collection of utility vehicles which has ever been seen under one roof. This will readily be appreciated when it is said that there are in the main hall seventy-four exhibitors of completed vehicles, while above, in the gallery, some sixty-three firms stage components and accessories of various types. Tire and wheel manufacturers are present in full force, and these, with the few incidental stallholders—trade papers and the like—bring the total number of exhibitors up to approximately two hundred. This is well in advance of any previous commercial vehicle show and compares well with pleasure-car exhibitions of previous years.

Manifold Nature of Exhibits

A special point for notice is the attractive staging of the vehicles, the customary cheap bunting and crude attempts at artistic decoration having been replaced by a simplicity of staging which has the effect of harmonizing more fully with the heavy type of vehicle on view. Another excellent feature is the absence of crowding; firms have been content to display three or four vehicles per stand at most and the result is that everything can readily be seen by the passing visitor.

The types on view range from the light parcels-express van to carry, in the smallest example on view, 400 pounds, up to the 6-ton truck which is adapted in many cases to haul a 4-ton trailer—though this practice is by no means customary in Great Britain. And at this upper limit are also to be found several steam tractors, a type of vehicle which is extremely popular for certain classes of work—notably where the material to be transported is not easily handled. In such cases the tractor can make one journey while additional trailers are being loaded up, and in this way a continuous service is maintained.

Additional to the goods transport vehicles there is full representation of the various classes of passenger vehicle. Taxicabs are, of course, exhibited in great number, about ten makers—mostly passenger-car firms—staging these.

The motor omnibus has six sponsors, all these exhibits being on standard lines except the Tillings Stevens with petrol electric transmission. Another extremely popular type of passenger vehicle is the "char-a-banc," to carry from twenty to thirty persons and mostly used for sight-seeing purposes at seaside resorts. There are at least a score of different makes on view, the chassis employed being practically the standard omnibus form, which, in turn, approximates in size to the 3-ton goods chassis, although greatly refined in detail. The average motor omnibus constructed under the London police regulations is a wonderfully efficient and satisfactory vehicle and throughout the country it is not only doing excellent work in passenger transport in outlying districts but is even defeating the street-car on its own ground in many cities. There is considered to be a wonderfully good future before this class of vehicle.

While on this subject it is worth while to state that, according to definite news published today, the big London General Omnibus Co., which has 2,600 motor omnibuses on the London streets, has been so thoroughly satisfied with the service given by the 300 Knight-rigged Daimler buses which have been running for twelve months past that they have decided to replace gradually all the poppet engines in their 2,500 buses with Knight motors. The Daimler buses in question are greatly favored by the public on account of their silence and smooth-running qualities, while the great power of acceleration enables the driver to pick his way through traffic to very best advantage, with the result that the Knight motor has now been selected as standard for future work. In view of the fact that the daily run of a London bus is 110 miles of very strenuous work, it must be admitted that the success achieved here is very notable indeed.

Additional to the several types of passenger vehicle previously referred to, there are half a dozen speedy and comfortable ambulances on view: these are now standard equipment for all hospitals and nursing institutions and are quite a normal sight in

the crowded streets. Similarly, the fire engines shown by the Dennis, Commercar, Halford and Leyland companies are used by practically every municipality in the kingdom to a greater or lesser extent. Such places as London and Liverpool use nothing but automobile engines for first aid work and are gradually replacing the horse vehicles as rapidly as the allocated funds permit. Every fire chief is an automobile enthusiast.

De Dion Road Watering Truck

There is only one example of the street cleaning machine: this, appropriately enough, is a French De Dion, for in Paris and elsewhere in that country they utilize these vehicles to a far greater extent than in England. The actual De Dion machine on view is a complex affair which can be utilized for watering the roads, for sweeping up refuse and for collecting and carting same away to the refuse dump. It has a 25-horsepower engine and normally runs at a speed of 12 miles an hour.

In the goods transport class, as was stated above, there is a wonderful variety of type and of classification. At the lower end of the scale, the number of vehicles staged is limited solely by the fact that the "cyclecar" variety of machine, which is to a large extent being utilized for express parcels delivery, is debarred from entrance by the rules. A cyclecar is still regarded by the S. M. M. T. as a glorified motorcycle and therefore it must be displayed solely at a motorcycle exhibition. But as the goods-adapted cyclecar will be debarred from the motorcycle exhibition, since the latter is for pleasure vehicles alone, it is clear that the makers of the lightest form of commercial vehicle are in something of a predicament. However, as they are, for the most part well filled with orders, they are not likely to worry much.

Rated at "under 1,000 pounds loads" there are five or six examples to be found in various corners of the show—but this is too small for the majority of makers, who prefer to take 1,250 pounds as the starting line. Here there are over a score of examples, pleasure car practice being evident in all of them—indeed, if the truth be whispered, they are almost all small car chassis without any alteration whatever. The average vehicle has a 10-12-horsepower engine, with three-speed gearbox and spiral worm drive.

Detachable wire wheels are frequently fitted to minimize risk of delay through tire trouble. In London there are scores of these handy little vehicles to be seen at work for the smaller stores. The larger houses prefer the next size, known as the 15 hundredweight (1,700 pounds). Nearly a dozen examples of this type are on view, including the productions of all the best firms. This promises to be a most popular vehicle now that costs have been reduced to a reasonable level.

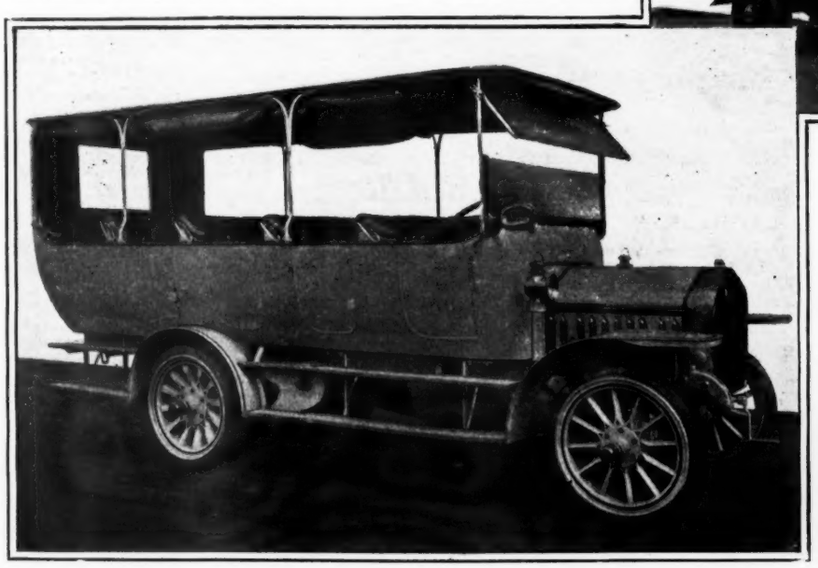
Pleasure car practice is still in evidence to a certain extent, although there is ample proof of special design in those features—such as suspension and brakes—where the heavier work is apt to show up badly. Engines average 15 horsepower, nearly always of pleasure car design, and curiously enough there is no case of a governed engine being provided to keep the speed inside safe limits. In view of the inexperience and carelessness of the average driver of this class of vehicle (for the mechanical driver is quite excluded by the low wages paid—say, $5 a week) the speed governor would seem to be a very necessary adjunct. But, as said before, the makers are only slowly developing this smaller class of vehicle—the interest has previously centered almost entirely on the 2- or 3-ton types—and hence one must give them a certain latitude till they have worked out the problem more thoroughly. Pneumatic tires are usually fitted.

As showing how the big development of the past 2 years in the commercial vehicle field has spread the makers over the whole of the classes, it may be interesting to tabulate the total number of exhibitors in each section—taking the maker's stated load capacity in each case:

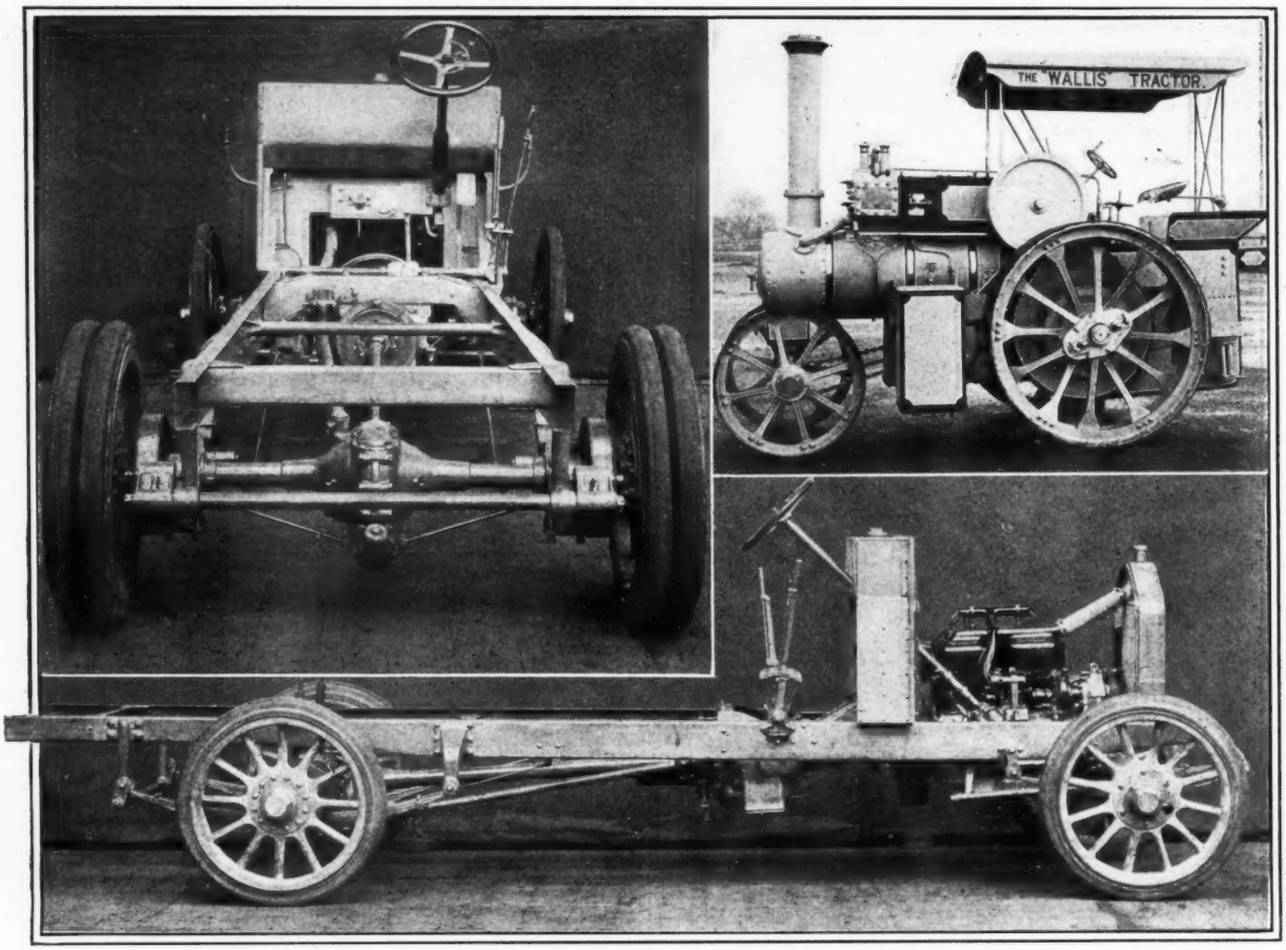
Capacity	Number of Exhibitors	Capacity	Number of Exhibitors
1000	5	5500	5
1250	10	7000	25
1700	11	10000	20
2240	9	12000	19
2900	6	13500	6
3600	9		2
4500	16		

From this it will be seen that the most popular classes are the 2-, 3-, and 4-ton—these being the sections which have been the longest developed by the old-established makers. But in view of the general attention being paid by every one to the smaller types it is likely that before the next show the makers of 1-ton and 3,000-pound vehicles will total to a score or so, without any diminution of the names in the bigger classes.

Royal mail wagon of 3 tons capacity. This is one of the types of vehicles in the postal service which makes the daily run from Birmingham to Manchester, carrying parcels post packages and heavy mail. The local post offices along the route are visited and the mail intended for them dropped off and the outgoing mail from these stations picked up



Bus having a seating capacity of twenty persons. The chassis has a capacity of 30 hundredweight and has five seats which extend transversely across the entire vehicle. There is a double step, and entrance to the seats is made by doors in the sides of the body opposite alternate seats. The general design of the body is that of the straight-line type



Upper left and lower—Wolseley 2-ton chassis. Upper right—Wallis 5-ton steam tractor

British makers are falling into the same mistake that they have consistently followed in touring car practice—they are making a multiplicity of models on the theory that there is virtue in numbers. To take as a worthy example one of the oldest firms, the Albion Motor Co., of Glasgow, the following list, culled from their Show catalog, well expresses the general failing.

Albion Goods Vehicles

Hundred weight	Horse-power	Drive	Chassis Price with Tires
10	15	Worm drive	£340
15	15	"	355
20	16	Chain drive	370
25	16	"	400
30	16	"	435
40	16	"	445
40	25	"	535
40	32	"	600
60	32	"	630
80	32	"	680

Albion Passenger Vehicles

Seats	Horse-power	Drive	Chassis Price with Tires
8	15	Worm	£365
10	15	"	370
12	16	Chain	400
15	16	"	410
24	25	"	535
28	32	"	605
34 double-deck	32	"	635
35	32	"	640
Ambulance	15	Worm	350

The total output is less than 1,000 per year, so the number of each type is obviously too low to render economical production possible.

One very interesting fact is the total absence of electric vehicles—not a single example being on view, for the simple reason that there are no electric trucks in England at all. There is a type of light three-wheeled vehicle which has been introduced within the last month or so, but this has hardly had a trial as yet. The Arrol Johnston company of Scotland promise to produce an Edison battery truck this fall; if so, they will be pioneers in this promising field, for with gasoline at its present level of 38 cents per gallon, electric power has a very fine chance.

A particularly useful field for the development of the electric truck would be in the 30 hundredweight (3,360 pounds) class. This is the popular size for most of the big departmental stores and there are half a dozen firms in London with over a score of this type of vehicle in daily operation—Harrods, for example, have seventy-two in service. It has been amply demonstrated that under normal conditions the running cost does not exceed 12 cents per mile and many cases are reported where the total expense has been kept down to the level of 10 cents per mile. These figures are on the basis of 400 miles per 5 1-2 days.

As a representative vehicle, the Stoneleigh may be mentioned. This is the production of J. D. Siddeley, one of England's most experienced designers. It has many original and special features, but so much confidence is placed in the head of this firm that the chassis is favorably criticised by all the technical authorities. Motive power is supplied by a 20-horsepower Knight sleeve valve motor and an inverted cone clutch connects it to the three-speed and reverse gearbox, whence the drive is through a propeller shaft to the worm-driven rear axle. The most remarkable feature is that the axle and gearbox are rigidly connected by a stout tongue and thrust tube which encloses the propellor shaft. Just in front of the gearbox is a large spherical joint located in a socket carried by a transverse member of the frame. For British practice, at any rate, this is entirely a new transmission system. The worm gearing of the axle is the hollow Lanchester type, for which a 50,000-mile life is guaranteed. Another good feature is the position and actuation of the foot-

brake. The worm-shaft is extended backwards and mounted thereon is a ribbed brake drum surrounding a pair of expanding brake shoes, and in order to avoid the use of bell crank levers the designers have employed a pair of bevel gear segments which give a neat and efficient actuation. The brake drum can be easily removed for renewal of the brake blocks. It should specially be noted that this brake has all the advantages of the usual transmission brake but it does not impose any stress on the joints of the propeller shaft.

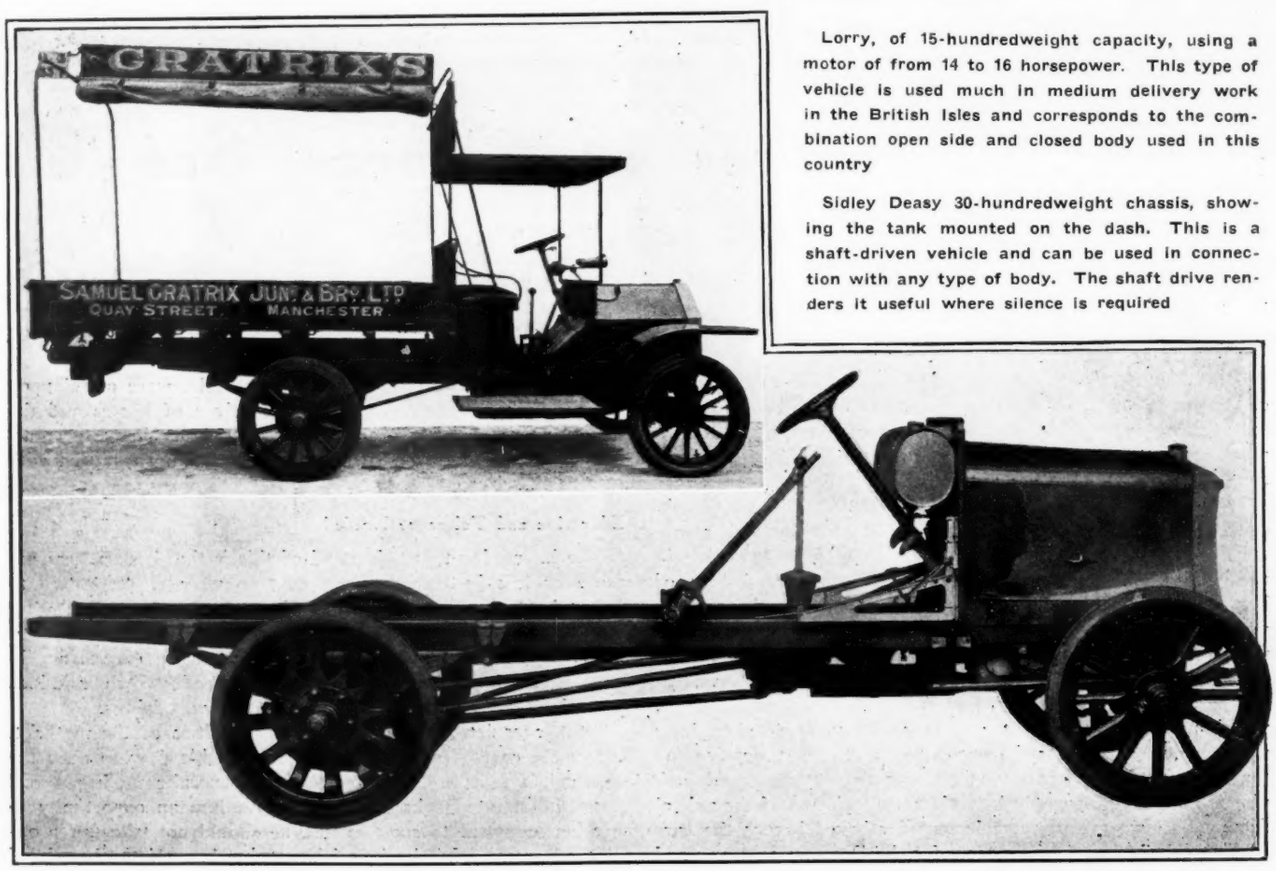
The Wolseley 2-ton model is an entirely new production which has been designed to fill the requirements of the War Department in the matter of the subsidy grant given to owners who will hold their vehicles at the service of the Government in times of war and during military maneuvers. The chassis is rather narrow, but the frame sides are unusually deep and well stayed. Standardized body attachments are provided; also towing hooks at the rear. A 25-horsepower, four-cylinder engine, a leather clutch and four-speed gearbox lead to the rear axle which has a double reduction by bevel and spur gearing. Since this model was introduced the war office authorities have removed their former embargo on worm gearing and the future Wolseley productions will therefore have the worm drive, following the touring car practice of this firm. Substantial torque stays are fitted to conform to the regulations, while springs, wheels, brake and all the other minor details are of the specified forms, the obvious idea being that spare parts for one make will be suitable for any other. Even such matters as gear ratio and position of control levers are specified—the latter so that any driver can be taken off one vehicle and put on another in case of necessity.

As regards 3-ton chassis, there are a score or more on view and practically every maker who is well known in the commercial vehicle world pins his faith to this size of truck as the most popular form. Invariably, there is a four-cylinder engine with pair castings of about 4.25 by 5 inches. A leather clutch, four-speed gearbox and propeller shaft drive to a double reduction bevel or single reduction worm axle are the average features, rarely departed from. If the chassis is used for passenger transport, a chain-driven gearbox with three speeds is usually employed. The only point in regard to which there is marked divergence of opinion is in the provision of torque and radius rods; some designers fit both; others, of equal standing, rely upon the springs to perform a triple duty. And in view of the fact that the latter practice has been consistently followed by at least three of the best-known firms for several years past, it is obviously incorrect to condemn the system off-hand.

While most makers prefer a channel steel frame of deep section, a few show a liking for a built-up ash and steel flitch plate construction which has the power of absorbing vibration to a considerable extent. Brakes are usually placed both at the rear hubs and not on the transmission line. Nor is it usual to have internal and external brakes on the one drum; two separate internal sets of shoes are orthodox practice. Cast steel wheels, with single solid rubber tires in front and twin tires at rear, are universally employed. There is a remarkable simplicity of detail work in the average 3-tonner, mainly because of the lengthy experience which makers have had with this type and which has enabled them to eliminate all superfluous accessories.

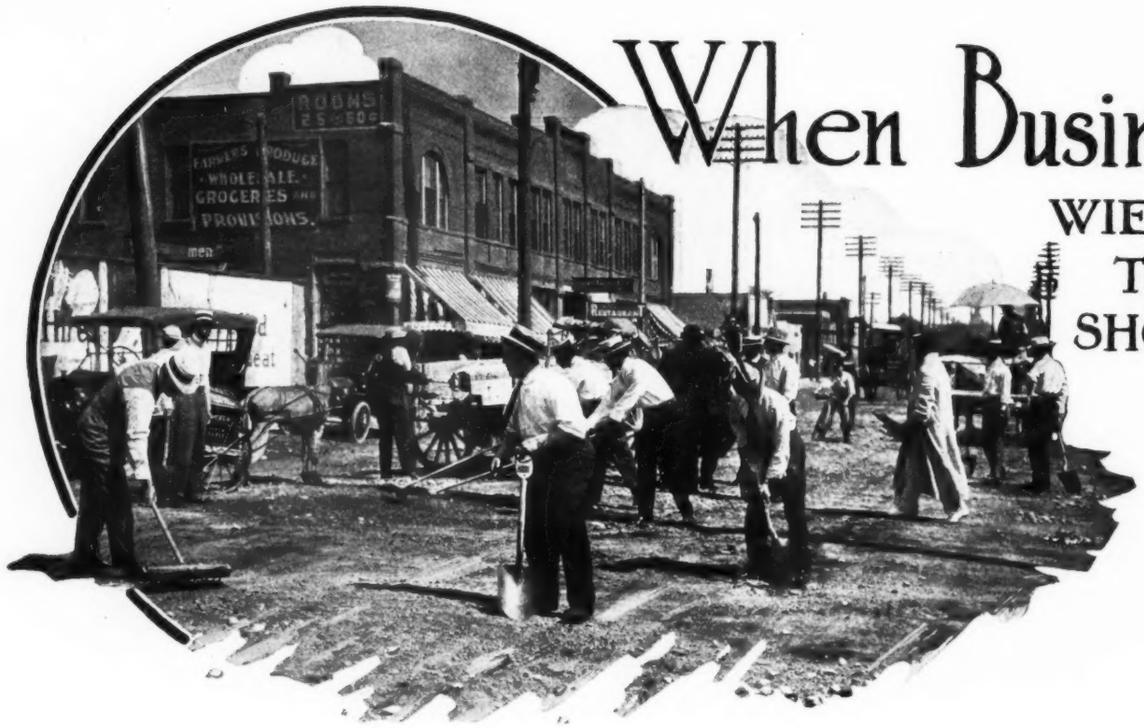
Two Propeller Shafts on Austin

The only outstanding exception to the general type is the Austin 3-tonner, which has a very novel transmission gear. The engine and gearbox are normally disposed, but the final transmission is by a pair of propeller shafts leading diagonally from the differential gear at the rear of the gearbox to the two rear wheels. This is said to be very satisfactory in practice and it has the obvious advantage of giving a very low body platform. The engine is rated at only 20 horsepower, but this seems to serve the required purposes. There are several special features of this Austin vehicle in addition to the transmission gear, notably the girder frame and the rear springing—a combination of underslung and overslung types which obviates the necessity for providing torque and radius rods.



Lorry, of 15-hundredweight capacity, using a motor of from 14 to 16 horsepower. This type of vehicle is used much in medium delivery work in the British Isles and corresponds to the combination open side and closed body used in this country

Sidley Deasy 30-hundredweight chassis, showing the tank mounted on the dash. This is a shaft-driven vehicle and can be used in connection with any type of body. The shaft drive renders it useful where silence is required



THE above illustration shows the business people of Pueblo working on the roads of the city. Business men, doctors, lawyers, and music teachers man the pick and shovel in a unanimous public spirit.

Pueblo County, Colorado, has probably more miles of A-1 good roads than any other County in the United States—at least, that is the boast that is made by the good roads enthusiasts of Colorado. The City of Pueblo is at the confluence of the Santa Fe Trail-Rainbow Route. The Santa Fe Trail runs in to Pueblo from Kansas City, thence turns southward to Trinidad. The Rainbow Route begins at Pueblo and is the shortest route from Pueblo to Salt Lake City of any road yet surveyed. It has the distinction of being the only road across the Rockies that is open at all seasons of the year. The business people of the City are practically unanimous in favor of the Commission Form of Government and have determined that they shall not be thwarted in their desires by local clamor for better physical conditions, and for that reason they have formulated themselves into squads.

Seeing Ourselves as Others See Us

By Frederick J. Hillman

THE public may now be divided into two classes—those who operate motor cars and those who do not. The first class may be divided into two more, those who operate motor cars and those who operate motorcycles. This division is chiefly important from the standpoint of those who do not operate motor vehicles of any kind, because motorcycles are so much more efficient in the production of heart failure and the constant expectation of a violent death.

The second general class may also be divided into two subclasses—drivers of horses and pedestrians. From the standpoint of the motorist one class can make itself about as obnoxious as the other. On the country roads the drivers of horses have the advantage, but in the city streets the chances are probably in favor of the pedestrian. As time goes on and the number of motorists increase, there are undoubtedly fewer tirades launched at them, but what they lack in number is offset by the increased violence of language. If the average person who is not the possessor of a motor vehicle were asked to draw a composite likeness for the purpose of picturing the prevailing type of motorist, the result would be a figure that would look almost human, but it would have the nose and eyes of the animal from which we get the complement for baked beans; the ears of the animal which is the mascot for the Democratic party; and it would be equipped with horns and spiked tail. And yet many of these Mr. Hydes are received in the best society and, when not in their cars, are perfect Dr. Jekylls.

On the other hand, if the average motorist were called upon to furnish a complete picture of the driver of horses and the pedestrian, I fear the result would be a figure in motley garment, perhaps perched upon a stool and certainly equipped with a tall pointed cap.

Education and Tolerance Needed

The interesting thing about all of this is that both classes are more or less justified in their contentions, and if we are to bring about an adjustment which will enable us to see each other as normal human beings, it must be through education and toleration. I place education first because when all classes are in possession of a clear understanding, respecting their relations to each other toleration and consideration will follow.

First, consider the duties and responsibilities of the motorist. As in the case of every good citizen it is his duty to obey the law and, if in its wisdom the great and general court has spread upon the statute books laws which give him an opportunity to use his judgment to some extent, he should not take unreasonable advantage of it by invariably giving himself the benefit of

the doubt. It is undoubtedly true that motorists as a class, observe the rules of the road much more closely than any other class of users, but there are still many who have the pernicious habit of taking chances and this is a practice that cannot be too severely condemned.

The motorist must remember that he has the same rights precisely according to his needs in the public ways that other users have, and no more, and he must always exercise the degree of caution that an ordinarily prudent man would exercise under similar circumstances. We frequently hear a motorist boast that he never drives his car faster than 20 miles an hour. But that does not necessarily follow that he may not be an even greater menace to the users of the public ways than the man who occasionally drives his car at a rate of speed of 50 miles an hour, or even more.

It is a question of good judgment as to time and place. It is the motorist who fails to properly reduce his speed at intersecting streets, in turning street corners, passing street cars and other vehicles in thickly congested districts, who forgets to signal when he is about to turn into a cross street or stop, and who fails to show proper consideration for the rights of other users of the streets and highways, who is the real menace to safe and comfortable travel, and who brings severe and oftentimes unmerited criticism and censure upon all of us motorists.

As to Drivers of Horses

Now as to drivers of horses: They also should comply with the law and they should also be familiar with and comply with the rules of the road. There is no possible question but that many of them fail miserably in both respects. The driver of horses has no right to assume that, because horses were in use before automobiles, he is entitled to ignore all the rules of conduct and make himself as obnoxious to motorists as circumstances will permit. He has no greater rights in the public ways than the motorist, and relatively his responsibilities are as great.

He, too, is supposed to exercise caution that an ordinarily prudent man would be expected to exercise under a given set of circumstances and, compared with the motorist, his responsibility is less only to the extent that a horse-drawn vehicle represents a smaller element of danger than a motor car.

Both classes of drivers should be required to obtain a license to drive, and such license should be granted only after a most thorough examination to determine their knowledge of the laws and the rules of the road and their ability to handle motor cars or horses.

Rights of Pedestrians

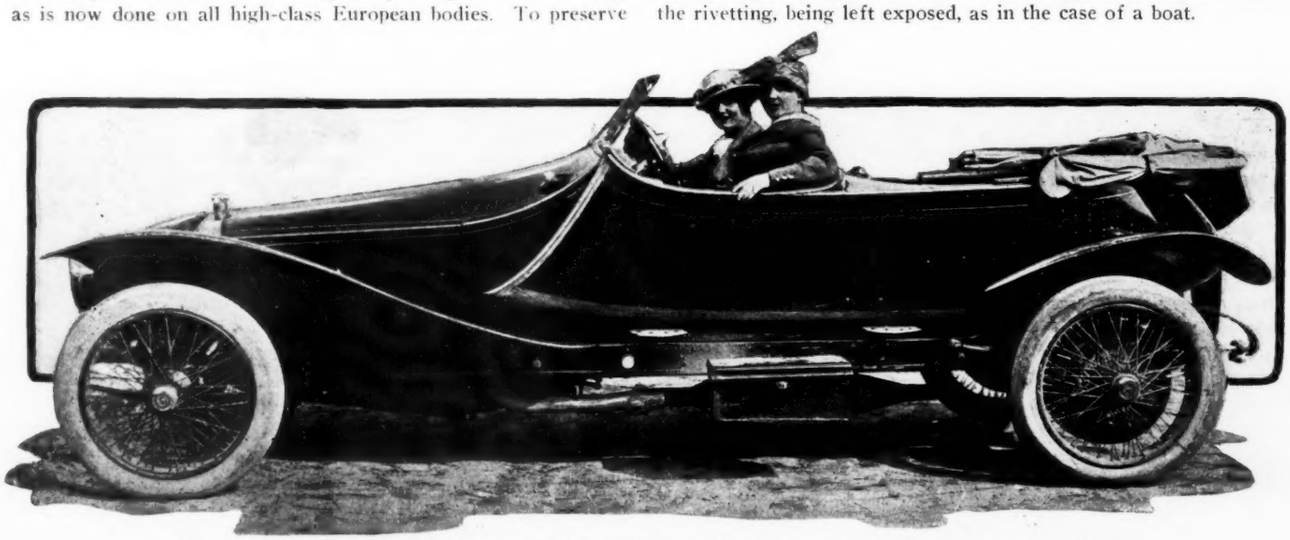
The pedestrian undoubtedly has greater rights in the street than either the motorist or the driver of horse-drawn vehicles ordinarily realize, yet he is required to exercise caution which an ordinarily prudent man would exercise under a given set of circumstances. Where a city provides traffic officers at street crossings it would seem to me that an ordinarily prudent man would make it a point to cross at those crossings, certainly during the busy time of the day.

If an ordinarily prudent man or woman, before stepping from the curb into the street in an attempt to cross, would look to see if vehicles were approaching, and would also learn that vehicles invariably travel in one direction on a given side of a street, and look in the only direction from which they may be expected instead of in the wrong direction, it would be safer for the pedestrian and more satisfactory and less nerve-racking for the drivers of motor cars and horses.

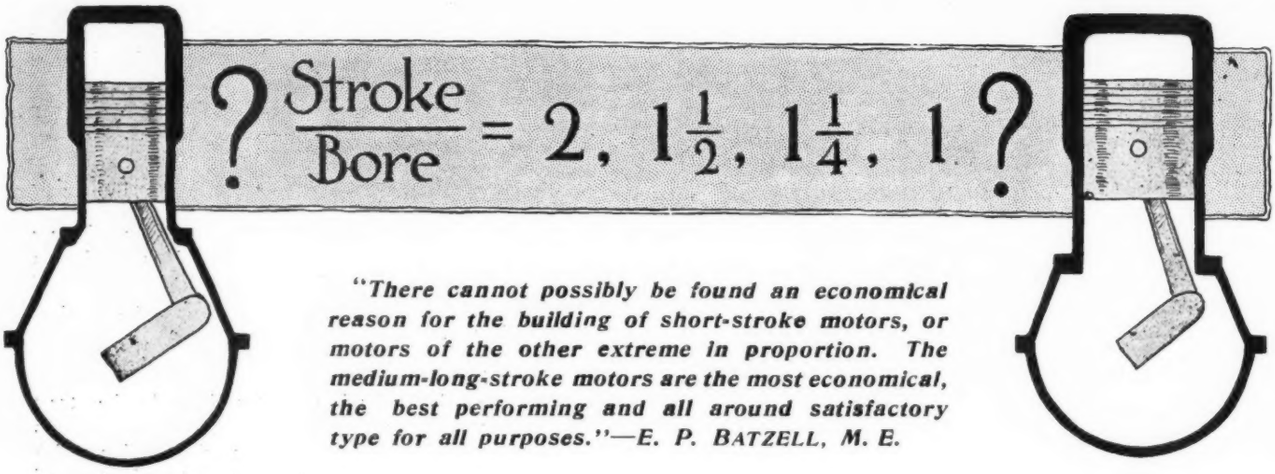
L'Automobile Avec le Tonneau a Bateau

PARIS, July 20—The Automobile with a boat body—One of the latest ideas in the sporting type of automobile is the pure boat body. One of these is shown in the accompanying illustration, built on a 20-horsepower Panhard-Levassor chassis. The body is built upon ribs, carvel type, in exactly the same way as a boat, has its bilge rounded off, and is made with a torpedo stern.

The most difficult feature for the boat builder was the design of the forward sections so that they would harmonize correctly with the bonnet without giving a cut-off appearance. Naturally, the bonnet has been specially designed for the body, as is now done on all high-class European bodies. To preserve the harmony of the lines, no doors have been made, the shape thus being continuous from radiator cap to stern. The gasoline tank is placed amidships just behind the front seats. In this position it forms a partial deck and still further adds to the boat-like appearance of the body. Electric lights are fitted, the side lights being let in the scuttle dash and the headlights being of the ordinary type. A dynamo is employed to generate current, this organ being under the foot boards just level with the dash and driven by an enclosed chain from the gearbox. Back of the rear seats is a locker. Except on the seats, there is no interior upholstery, the sides of the body, with the ribs and the rivetting, being left exposed, as in the case of a boat.



New French automobile body that is fashioned along marine lines, having a bilge and torpedo stern



"There cannot possibly be found an economical reason for the building of short-stroke motors, or motors of the other extreme in proportion. The medium-long-stroke motors are the most economical, the best performing and all around satisfactory type for all purposes."—E. P. BATZELL, M. E.

Most Efficient Stroke-Bore Ratio

Engineer Gives Reasons Why Medium Stroke-Bore Ratio Is Best

By E. P. Batzell, M. E.—Part I

*Advantages of the long-stroke motor type.

1. *Smaller mechanical losses and less wear in the motor bearings.*
2. *Better thermal efficiency in the medium long stroke type as caused by the decrease of heat losses from the cylinder and better mixing of the fresh charge at its entrance into the cylinder.*
3. *Smaller fuel consumption per unit of delivered power due to the above reasons.*
4. *Higher range of the maximum obtainable piston speed.*
5. *Higher specific power development.*
6. *More favorable type of motor for high compression and explosion pressures.*
7. *Better for the use of poor grades of fuel.*
8. *Less gas leaks around the piston, smaller loss of pressure in the cylinder.*
9. *Less harmful influence on the motor performance by the expansion and distortion incurred due to the heating of the pistons and the cylinders.*
10. *Better access afforded to the valve parts and to the motor piping, due to greater height of space available for their location.*
11. *Bettter low-speed performance characterized by the ability to lug load.*
12. *Somewhat lower temperature and pressure of the exhaust.*

*Disadvantages of the long-stroke motor type.

1. *Motor accelerates with more vibration and less smoothly, unless extra light moving parts are used.*
2. *The distance between the crankshaft and the camshaft is greater (to provide for connecting rod clearance), requiring correspondingly larger timing gears, with higher peripheral velocity and more noise.*
3. *Heavier valve mechanism parts resulting in noisier valve action.*
4. *Generally uncommon motor design and appearance with extra great stroke-to-bore ratios, particularly if large valves are retained.*
5. *Less adaptable to those motors when two-bearing crankshafts are used for the four-cylinder construction, and three-bearing crankshafts for the six-cylinder, on account of greater crankshaft deflection in its weak plane.*

*Above points are stated considering that in every instance all other items in the compared short or long-stroke motors are alike. The advantages of the long-stroke type can be considered simultaneously as disadvantages of the short-stroke type, and vice versa.

THE IMMENSE attention which for years has been devoted to the long-versus-short-stroke-automobile-motors controversy has failed to bring before the public clearly defined attempts to secure the most efficient stroke-to-bore ratio. A great number of treatises are available which discuss the general advantages and disadvantages of the long and short-stroke motors, however without any effort to settle the limit of motor proportions, when the most efficient combination is obtained.

Very frequently one finds passages, when the authors merely state, that although their derivations tend to favor one of the motor types, nevertheless they personally believe another motor type, of medium stroke-to-bore ratio, as the better one, which they see being confirmed in practice.

Why those practical results seem to run against their theory no public efforts were made to investigate. Therefore it is not surprising that the general public, at least a great part of the latter, still remains in ignorance as to the relatively best motor proportions and the rules governing the selection of these proportions.

Such a state of things is indicated by the continuation of inquiries in the readers' columns of the leading automobile magazines as to the relative advantages of the long and the short-stroke motors. Besides, even from the professional automobile engineering side, one has to meet with facts, indicating that the substance of many points in the long-versus-short-stroke-motor controversy have not been properly assimilated by all, which results in a faulty judgment of facts and features interconnected with the latter.

It is my ambition to disclose a trend of discussion by which one could obtain more or less reliable results in any practical case as to the best stroke-to-bore ratio from the standpoint of general efficiency. Like in many other problems, the selection of the constants entering various equations will affect materially the final results. But inasmuch as the way chosen to reach these results does not depend on the constants, no further harm can be done by the selection of the latter than to leave everybody free to use the data of his own experience, which in the matter of constants applied to the same purpose cannot show much variation.

These articles being intended equally for the general automobile public and also for some professional circles, it has been deemed best to preserve a more or less elementary character in its main part, including only the simplest forms of calculations which are suitable to the interests of the

general public. That part of the article which for the sake of complete explicitness deals with the theoretical derivation of some results used in the main part, is formed as an appendix.

It is suitable for those few who would like to follow up the described situations quite closely. Referring at the present to the derivation of results and of some factors in the main part of the article to its theoretical appendix relieves one from the necessity to mention this fact every time in the course of the story.

In the long-versus-short-stroke-motor controversy the biggest efforts have been directed towards the proving of the superiority of either motor type in the matter of its general efficiency. This general efficiency as far as motor power output per unit of cylinder volume and consumed fuel is concerned, is composed of the motor efficiency mechanical and thermal.

The influence of the stroke-to-bore ratio on either of them will be explained separately, and subsequently the influences will be merged.

Constructive features of the different motors which are favorable for the motor power output, other conditions being the same, also can be considered separately as a special form of efficiency.

Must Have Basis of Comparison

Thus far it is in vogue to base all comparison between long and short-stroke motors upon the results obtained from two motors with equal bore but with a material difference in their strokes; or, from motors of equal piston displacement but with a great difference in their stroke-to-bore ratio. In the present instance preference is given to the second method, which appeals as the most logical one. However, in particular cases characteristic results of the first kind of comparison will be indicated also. The motor sizes of approximately equal piston displacements selected here for all future comparison are the same as have been used frequently for similar purposes by other authors, thus facilitating comparison between the results obtained from different sources.

These motor sizes are:

1—A square motor 4.5 by 4.5.

2—A medium long-stroke motor 4 by 5.75.

3—A long-stroke motor 3.57 by 7.14 in.

Lengthening the stroke tends to improve the motor's mechanical efficiency, which is conditioned principally by the nature of the power losses in the crankshaft and connecting rod bearings.

It is obvious that under the assumption or all around equal conditions the indicated power (the power developed inside the cylinder) developed in the motors will be proportional to their piston displacement; consequently in this case the motors of the sizes standing in comparison should be credited with an equal development of indicated power, which means an equal mean effective pressure upon their pistons.

With a mean indicated pressure of 75 pounds per square inch gauge the piston of the square motor is subject to an average effort of 1,200 pounds, whereas that of the 3.57 by 7.14 motor transmits only 750 pounds, respectively 37 per cent. less than the first.

It is practical to assume within the limits of the pressures existing in the crankshaft and connecting rod bearings that the friction in these bearings remains alike and does not depend on the specific pressure therein (pressure per unit of the bearing surface). The work of this bearing friction therefore will be proportional to the total load carried upon it and to the velocity of the bearing circumference. The latter item in its turn is proportional to the bearing diameter, because the motors of equal piston displacement, as in our example, should be compared at equal revolutions per minute. The bearing diameters generally increase with the bore of the cylinder, though not quite in direct proportion. The increase of the bearing is somewhat more rapid with the larger bores, but it is influenced by many other considerations which prevent one from establishing a definite rule.

The surface of each bearing pin makes one complete revolution in the bearing shell at every revolution of the motor, this entirely regardless of the stroke in the latter. **Therefore the circumferential or surface velocity respectively traveled in all the bearings of the square motor is greater than in the long stroke type approximately in proportion of their diameters.**

This difference in the above example amounts to about 20 per cent. Assume that the diameter of crankshaft and connecting rod bearings in the square motor is 2 inches. The effort acting upon the piston from the cylinder pressure is distributed upon two symmetrical crankshaft bearings, absolute crankshaft rigidity being practical for the purpose. The total friction loss in the lower connecting rod and in the crankshaft bearings will consist of the resistance offered to the action of the full piston force P upon the former and to the action of two forces together equaling also the force P in the latter places. With a friction coefficient of .05, this total bearing loss at 1000 revolutions per minute of the square motor can be figured by means of a simple equation as follows:

$$\frac{2 \times 1{,}200 \times .05 \times \pi \times 2 \times 1{,}000}{12} = 62{,}500 \text{ foot pounds per minute} = 1.9 \text{ horsepower.}$$

Similarly calculated the losses in the long-stroke motor will be much less on account of the smaller bearing pressures and on account of the smaller bearing diameters as well, their total being

$$\frac{2 \times 750 \times .05 \times \pi \times 1.75 \times 1{,}000}{12} = 34{,}400 \text{ foot pounds} = 1.04 \text{ horsepower,}$$

or about .86 horsepower less than in the square motor. This power gained for the effective power output of the long-stroke motor represents a big amount, inasmuch as it equals about 12% of the actual motor power output. The long-stroke motor is that much more efficient than the short-stroke one in the matter of their bearing losses.

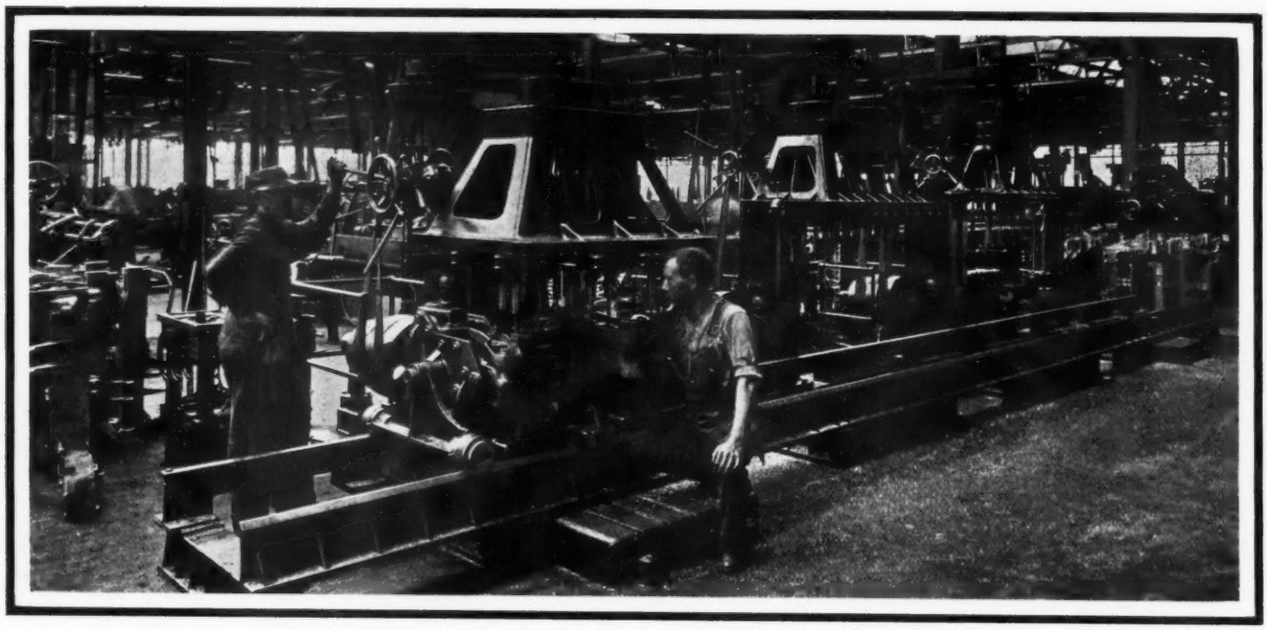
Motor Friction in Rings and Pistons

The piston friction losses of the motors may be limited to the consideration of the friction of the piston proper and that of its rings. The piston friction is caused by the side thrust of the connecting rod due to its angularity with the cylinder axis, which angularity varies all through the motor stroke. The graphic illustration of the formation of this side thrust, is to be shown later, where the symbols indicate also the items in the formula for determination of the side thrust, which reads

$$p = P \times \text{tg } a.$$

Assuming equal proportion of connecting rod length to the stroke in both motors, the variation of the item "tg a" in the formula also will be of identical character and value. **Therefore the side thrusts of the two pistons will compare as the forces acting upon them, in other words the side thrust at any moment will be about 37% smaller in the long-stroke motor. On the other hand, the longer stroke increases the course of these friction forces in same proportion as the strokes. That motor will have the greater loss in piston friction, in which the product of the piston force multiplied by the stroke gives the bigger item, providing the motors have an equal ratio of connecting rod length to the strokes.**

It is impossible to calculate in an elementary way what the actual piston friction loss may amount to, because there are two varying items to be considered simultaneously, the piston thrust and the piston velocity at the respective moments. At any rate, this loss has no influence upon the comparison of efficiency.



Railroad gang drill that finishes ninety-five Continental crankcases in one day

Drills a Crankcase in Seven Minutes

New Continental Machines Make Record Time

QUICK handling of crankcases is essential in order that the work at this end of motor manufacture keep up with the other branches. The illustrations at the top and bottom of this page shows how the work is being handled in the large shops of the Continental Motor Mfg. Co., at Detroit.

The big machine shown at the top of the page is known as a railroad gang drill. In the railroad gang drill the work is carried along on tracks under each set of drills and the transportation from machine to machine is so shortened that the work can be done in record time. Each set of drills takes care of all the holes that can possibly be done at one time and then the piece is passed on to the next drill set where the multiple spindles again come into play and do the drilling work or reaming, as the case may be on another side.

The radial drill shown at the end of the track in the illustration will be replaced within a few days by another gang drill and this will enable all the crankcase boring work to be done in even shorter time.

In one of the Continental motor crankcases there are ninety-five holes to be drilled. Passing through the machine there will be eighty-five crankcases per day. In other words with this set of drills there will be 8,075 holes made per day. One crankcase will be finished every 7 minutes as compared to the maximum output of one every 18 minutes with the former radial type drills. This is more than twice as fast.

The entire jig moves along the tracks with the crankcase and it only takes 1.5 minutes to put the crankcase into its jig. No lifting work has to be done by the men on the job as a hydraulic crane lifts the jig on the tracks and also puts the cover on the jig. As the jig is of the universal type the work can be turned over and the crankcase drilled from the sides and ends without making a change. One jig takes care of the whole operation and accurately centers all ninety-five holes.

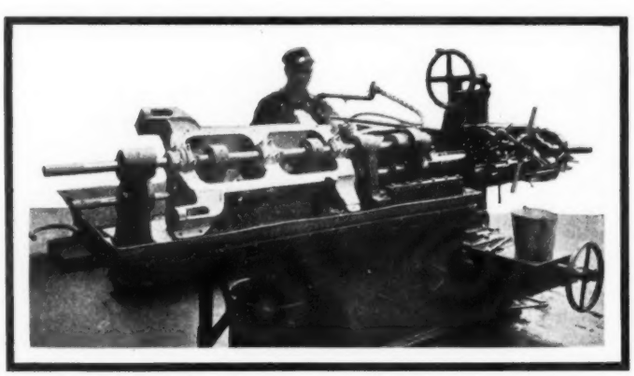
The two men shown in the illustration can run the crankcase through the whole operation as compared to the necessity of having a man on each of the radial drills formerly employed.

The jig is equipped with rollers which operate on the steel track and it is light work to push the jig with the crankcase included from one position to another along the track. The jig is locked in place as it is centered below the drills and there is no possibility of vibration in the tracks, offsetting the work because of the heavy bed plate below the drills which help carry the weight of the track as well as that of the work and jig.

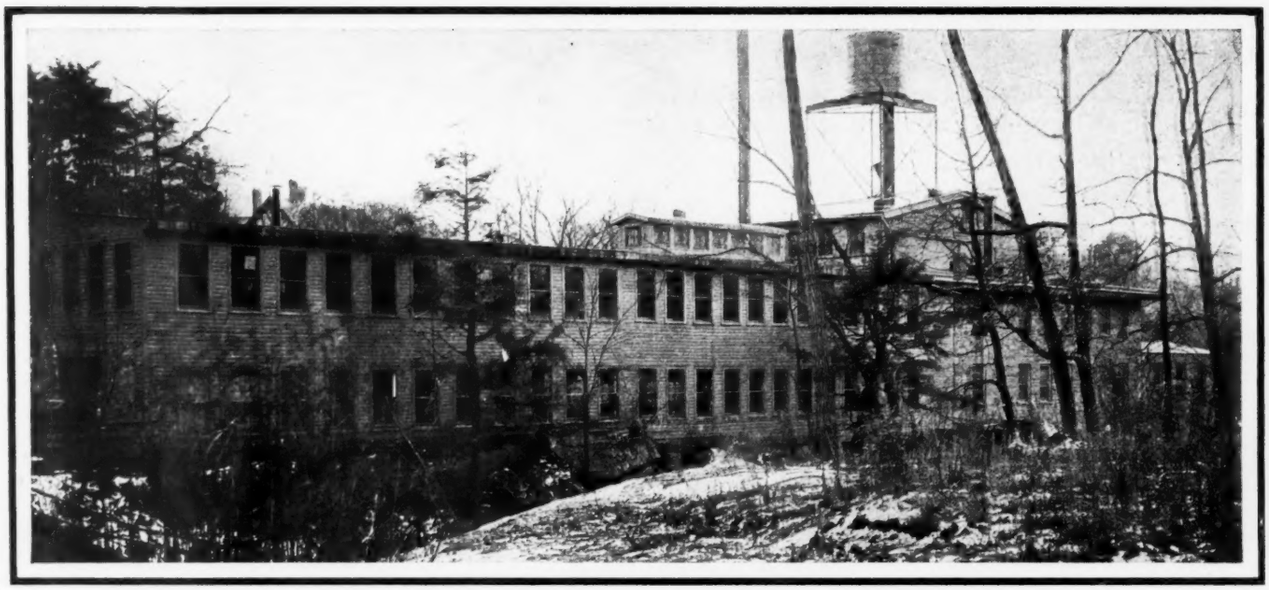
The jig is balanced and is carried on lubricated bearings which render it possible to turn it over by a simple movement not requiring the exertion of much strength.

The illustration at the bottom of this page shows an original boring mill also used in the works of the Continental Motor Mfg. Co. This machine was built to accomplish the crankcase boring work in a speedy and accurate manner. The holes bored are for the crankshaft, camshaft, pump shaft and magneto shaft bearings and bushings.

As will be seen from the illustration, the machine includes four multiple spindles operating ten cutters. The actual working time on the job itself in the hands of the skilled workman is 16 minutes. The entire setting up of the job takes but 3 minutes



Original boring mill designed by Continental company



Side view of the Ward Leonard plant located in the Bronx valley, Bronxville, N. Y.

Ward Leonard Completes Its Addition

Adds Another 2,000 Square Feet to Working Area

ONE of the factories near New York which has been growing not only in prominence as regards its product but also in the size of its plant is that of the Ward Leonard company. The two illustrations on this page show the completed home of the Ward Leonard products as it now stands.

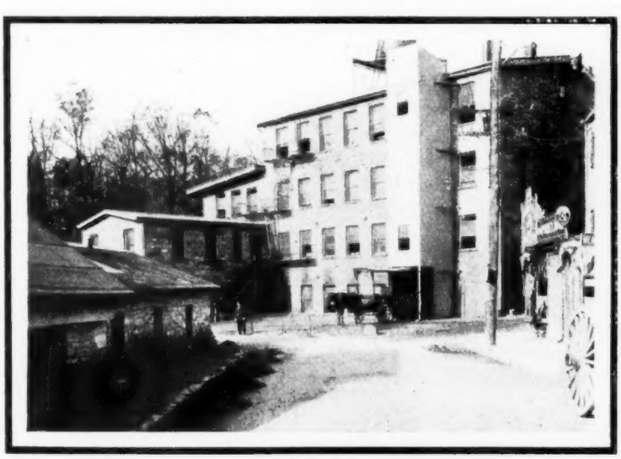
This concern is one of the many which has turned its attention to the electric starting and lighting system manufacture after a long experience in other lines. The present organization was founded in 1902 and since that time has specialized in electric controlling devices. This is the seventh addition which has been made to the factory and renders available 2,000 more square feet of operating space than could formerly be used.

During the 20 years of its existence the Ward Leonard company has moved from Bridgeport to Hoboken and thence to Bronxville where it has been for upwards of 15 years.

An attempt was made at one time by the Ward Leonard company to build complete automobiles and about fifty cars were turned out between the years of 1901 and 1903. Owing to the difficulties encountered in securing material to build the cars the attempt was given up during the latter part of 1903.

The Ward Leonard company had a starter running as early as 1902. There were two of these made and one was put on one of the cars turned out by the company at that time. The car made by the Ward Leonard company was known as the Knickerbocker and this car was probably the first electric starter equipped car.

The present starter has been on the market for about 1 year and has been adopted on many leading makes notably one of foreign manufacture.



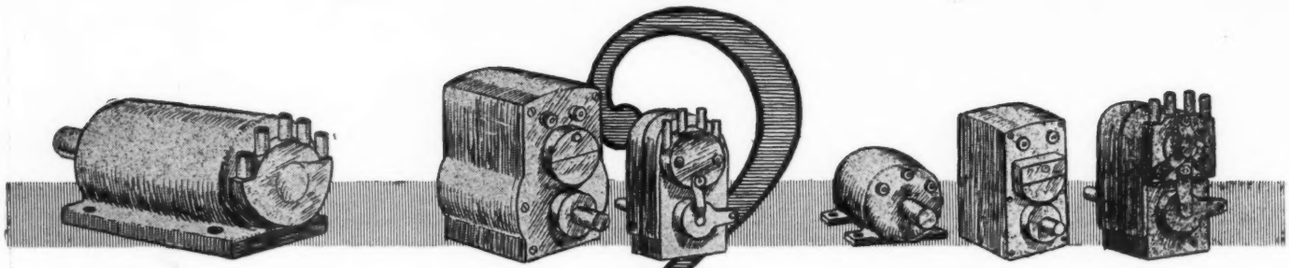
Entrance to offices of the Ward Leonard company

The starter has several features which distinguish it from other electric types. It is a three-unit type, having the generator and cranking motor as separate units, while the magneto also is separate, thus giving a separate unit for each system—lighting, starting and ignition. The entire system operates at 6 volts and either battery or magneto ignition can be used, as the ignition circuit is altogether independent.

The Ward Leonard cranking motor weighs about 38 pounds for a 45-horsepower motor and the company builds in addition a smaller cranking motor for engines of less than 25 horsepower. The characteristics of these motors differ somewhat from the general run of 6-volt apparatus in that they are designed for high speed. When under load they run at from 2,500 to 3,500 revolutions per minute. As a result the gear ratio necessary varies from thirty to one to forty to one.

The current required for continuous cranking varies from eighty to 100 amperes at 6 volts. This will crank a motor from sixty to 100 revolutions per minute, depending upon its size. The most usual method of connecting the motor to the engine with this system is through the flywheel. On account of the large gear ratio necessary with this cranking motor it is almost necessary to include the flywheel in the gear train in order to reduce the size of the gears.

A special switch is also used for cranking. It consists of laminated copper strips about 1.25 inches wide and 5 inches long. They are fastened to a copper block forming one of the terminals of the switch at one end and are brought into contact with another block when it is desired to start.



Engineers Disagree on Starter Units

Part II

Gray and Davis Urge Merits of Three-Unit System—Churchward Explains Requirements

Henderson Engineer Also Prefers Three-Unit Type

The Six Questions

1—*Which will be the eventual system, namely, (a) Unit system in which starting, lighting and ignition are combined; (b) two-unit system in which starting and lighting are combined with ignition separate; (c) three-unit system in which ignition, starting and lighting are separate?*

2—*Respective methods of coupling starting motors with the gasoline motor.*

3—*Possibilities of weight reduction in starting systems?*

4—*Increased accessibility of the battery for starting and lighting purposes and if excessive initial draw from the battery is injurious?*

5—*Positive locking means whereby tampering by outsiders cannot lead to shorting and discharging of batteries?*

6—*Movement to discourage senseless demonstrations of starting motors in which they are used to propel the car for a short distance?*

LAST week we published the opinions of three of the makers building electric starters on the relative merits of the unit, two-unit and three-unit systems for starting, lighting and ignition. We also published the views of two leading car engineers. In the current issue is the second instalment of engineers' views on this interesting question. There are more to follow. Some companies have asked for longer time in which to answer the six questions asked by THE AUTOMOBILE.

In this issue Alexander Churchward of Gray & Davis explains from an electrical viewpoint why he favors a separate motor for starting and a separate generator for battery charging. He claims that the characteristics of a starting motor and a generator are diametrically opposite to each other, making it necessary to make the two separate in a successful system. Mr. Churchward ends his communication by giving the seven requisites of a satisfactory system.

J. M. Smith of the Henderson company favors three separate units. He thinks all systems are too heavy and recommends using aluminum where possible in order to reduce weight.

Three-Unit System Most Efficient—Churchward

BOSTON, MASS.—Editor THE AUTOMOBILE—It is my sincere belief that the three-unit starting-lighting system offers the most efficient method of cranking and lighting a motor car. This belief is not the result of theory, but is based upon facts substantiated by the service our system has given during the past 2 years. In order to make clear the reason why I believe the three-unit system to be preferable, I shall outline the features of such a system, and use, as an example, the Gray & Davis starting motor and lighting dynamo.

In this system, the starting motor is used to start the car and the dynamo (generator) for charging the battery and lighting—each has its own distinct function to perform.

In designing electrical devices for automobiles, simplicity becomes the big vital factor and the three-unit system enables us to attain not only maximum simplicity, but power and extreme ease of operation as well.

At the beginning, I considered the starter situation from every point of view. My experience embodies 22 years in designing direct-current generators ranging from 0.25 to 3,000 horsepower, with voltages from 2 to 750. I determined therefore to design a starting motor which would successfully operate on the standard lighting and ignition voltage—namely 6 volts.

Motor Built Like Electric Car Motor

Now as to the starting motor itself. The development of electric starters in general has been along the lines of the electric automobile motor. In perfecting our starting motor I was fortunate in having had 14 years of experience in building electric automobile motors. Therefore, I at once began the building of a starting motor along the same lines, realizing that in this way I could secure the highest efficiency and output when used in conjunction with a storage battery. It is comparatively easy to design a motor for a given efficiency and output, when connected to an unlimited source of supply, such as an electric light main; but designing a motor to be used in conjunction with a storage battery of small capacity is a far more difficult proposition. Again referring to the electric automobile motor, one of the greatest difficulties in perfecting it was the matter of commutation; that is, sparking at the brushes. A dirty or burnt commutator meant trouble and failure. These motors have now been perfected to such a high degree that the best do not require attention more than once a year.

It is absolutely necessary in designing a motor for starting purposes to have perfect commutation when used on low voltages. This means insurance against trouble and spells reliability of the equipment.

First: For the reason that the source of supply is not always constant, as the capacity of a storage battery rapidly decreases as the draught on it is increased—such as starting a large engine in cold weather or against extremely high compression with heavy oil as a lubricant.

Second: That the battery may not be fully charged and the voltage low.

Third: That in very cold weather the capacity and voltage of the battery are considerably lower than in good weather; and in conjunction with this, the engine will be very stiff, as anyone knows who has had to crank the engine of a large-sized car—this will necessarily call on the battery for more energy at a time when its capacity has been reduced because of climatic conditions.

We developed the first successful 6-volt starting motor that would spin the largest six-cylinder engine on the market fast enough to fire on the magneto. It is essential to make the starting motor powerful enough to spin the engine fast enough to fire on the magneto, unless some other source of current is available for ignition, for the reason that if the starting battery voltage is low when turning the engine over, and the same battery is used for ignition, the coil will not operate—and, therefore, there will not be a spark in the cylinders.

Motor Is Capable of Vaporizing Gas

Again, if the motor is capable of spinning the engine fast enough to operate the magneto, it is also capable of vaporizing the gasoline in the carbureter. This is essential, especially so when we consider the low grade of gasoline now being sold.

To make a successful electric starter, that will operate the engine at high speeds we must have a very efficient electric motor; and this can only be obtained by designing the motor for all conditions to be met in actual service, **and cannot be done by combining the dynamo with it.**

The dynamo must be designed for its own particular work; that is, charging the battery—but not overcharging it. Overcharging a battery destroys it more quickly than anything else. The dynamo must also be capable of lighting the lamps even if the battery becomes disconnected, without burning out the filaments.

These characteristics are diametrically opposite to the characteristics of a successful starting motor—emphasizing the necessity for two units.

Another advantage of the two-unit system is apparent at a glance; if anything happens to the starting portion of a combined system, nine times out of ten the car will be without lights; while, in the two-unit system, if anything happens to the starting unit—such as stripping the teeth on the gears, or breaking a chain—all that is necessary is to start the engine in the old-fashioned way, as the dynamo being a separate unit will take care of the lamps, even if the battery is broken or otherwise out of commission.

With Two-Unit System Lights Are Sure

Also consider the saving in weight. There are single-unit systems that weigh fully 70 pounds more than the two-unit system and this, of course, adds to the cost of car upkeep.

In our system two separate units are so designed that each is able to perform its own function with a small 6-volt battery and less weight than a combined unit, with its heavier battery, especially when the speed of the engine when starting is taken into consideration; or, to put it plainly, for a given speed of engine, the system using the combined-unit will weigh considerably more than the system using two separate units.

A dissertation on the two-unit system would be incomplete without emphasizing the importance of the 6-volt battery of ignition type. It is very much lighter and, of course, more compact than the systems which require 18 and 24 volts. The most exhaustive tests and 2 years of actual day-in-and-day-out service have demonstrated the fact that 6 is the proper and most efficient voltage in use.

Starting Motor Stops When Engine Starts

With our system, after the engine has fired, the starting motor comes to a complete rest. It requires no power to keep a heavy armature revolving and consequently does not exert a dragging influence on the engine. Incidentally there is no wasted energy.

Another point is the question of winding. In some single-unit systems the starting and lighting windings offer a compromise winding that nullifies the effectiveness of both the starting and lighting units. Such a condition is impossible in the correctly designed two-unit system.

The successful starting motor must measure up to a high standard of efficiency. I have appended hereto, the requisites of a good system—the things a starter should do without effort.

First: A starting motor capable of spinning the engine fast enough to fire on the magneto under adverse conditions, such as extremely cold weather, battery voltage below normal, due to cold weather, or when battery voltage is low because not fully charged.

Second: A motor so designed that there will not be any sparking at the commutator or brushes; and the only attention needed is lubrication once a year.

Third: A dynamo capable of charging the battery, but not overcharging it.

Fourth: A dynamo whose electrical parts are not subjected to high speeds under any condition of engine or car speeds.

Fifth: A dynamo capable of carrying the lamps, even if battery is disconnected or broken, without burning them out—even under adverse conditions, such as high car speeds or racing engine.

Sixth: A dynamo so designed and constructed that it will run tens of thousands of miles without any attention being given to brushes or commutator. The only attention that should be necessary is lubrication.

Seventh: A system as a whole that is even more reliable than the best magneto.

Car Makers Confirm Good Judgment

Inasmuch as I am so emphatically in favor of the two-unit system I should like to say that my judgment has been verified by the adoption of our system by thirty-two automobile builders. In other words, a large majority of the leading makers prefer the two-unit system and use it as standard equipment on their product.

In the last analysis it seems to me that the two-unit presents so many advantageous features that it will be the eventual system. In any event, it has proved extremely successful and I believe the popularity of our system gives evidence of this fact. —ALEXANDER CHURCHWARD, vice-president, Gray & Davis, Inc.

—

My Ideal Is a Three-Unit System—Smith

INDIANAPOLIS, IND.—Editor THE AUTOMOBILE—The writer's opinion as to what ultimately will be adopted as universal starter equipment is that this is just about as problematical as the universal adoption of a standard gas engine.

The writer's personal desires would be something like the following:

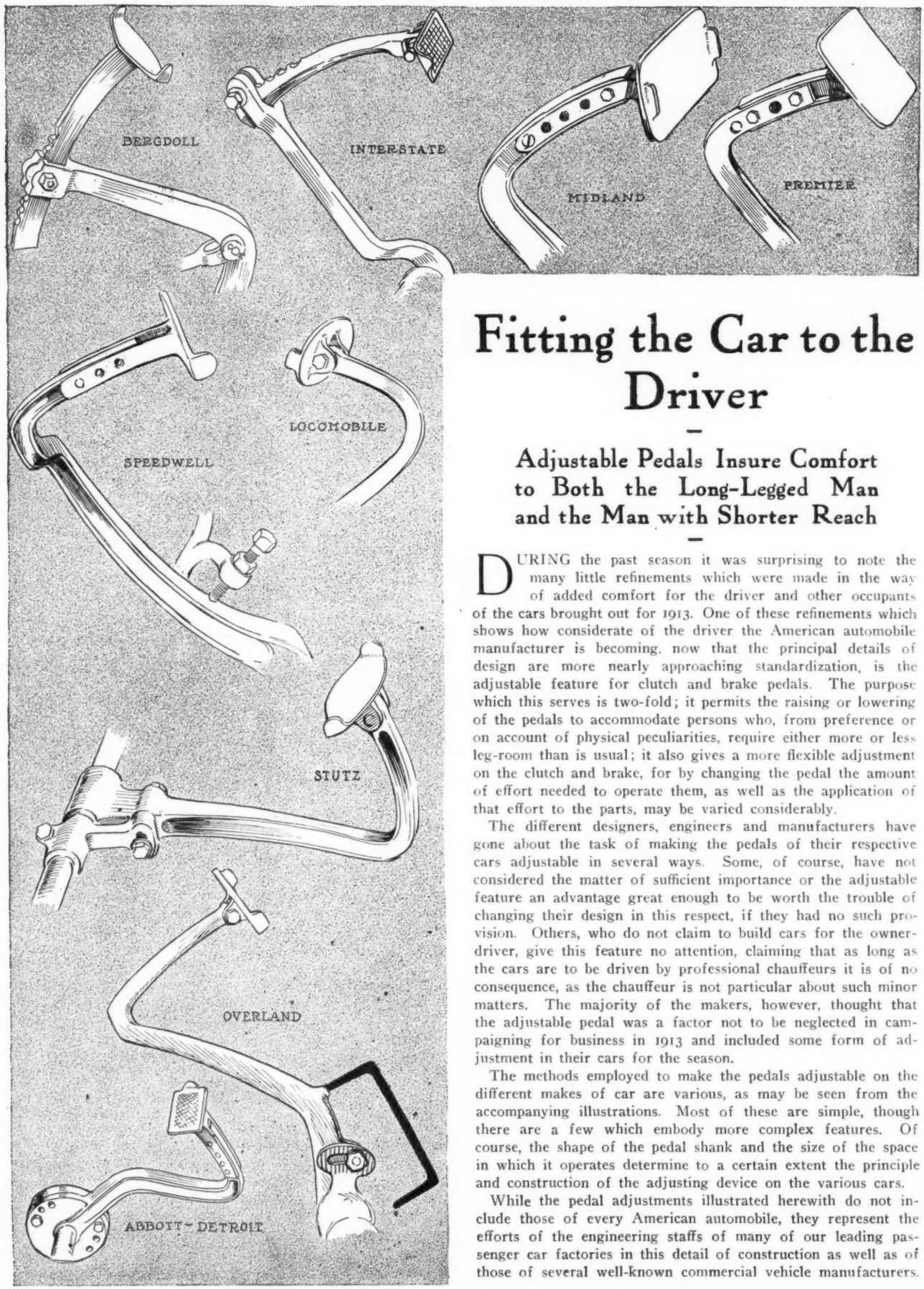
First, a three-unit system, in which the ignition was entirely separate and independent from the lighting and starting device, the lighting and starting apparatus to be of two separate units, so far as winding and casing are concerned, but a single unit in point of mounting.

Second, it should be mounted to drive to the front end of the motor through a silent chain.

All the Apparatus Seems Abnormally Heavy

Third, all the apparatus to date seems abnormally heavy; it seems that at least a portion of this could be overcome by using gray iron only when absolutely necessary, as conductor, the rest of it to be of aluminum or possibly parts of it of sheet metal.

Fourth, as far as accessibility of the battery is concerned, this should be true, to the extent of easy access for an exchange of batteries, should same be necessary, but on a well-balanced and well-installed outfit this should be of very rare occurrence.—J. M. SMITH, factory manager, Henderson Motor Car Co.



Fitting the Car to the Driver

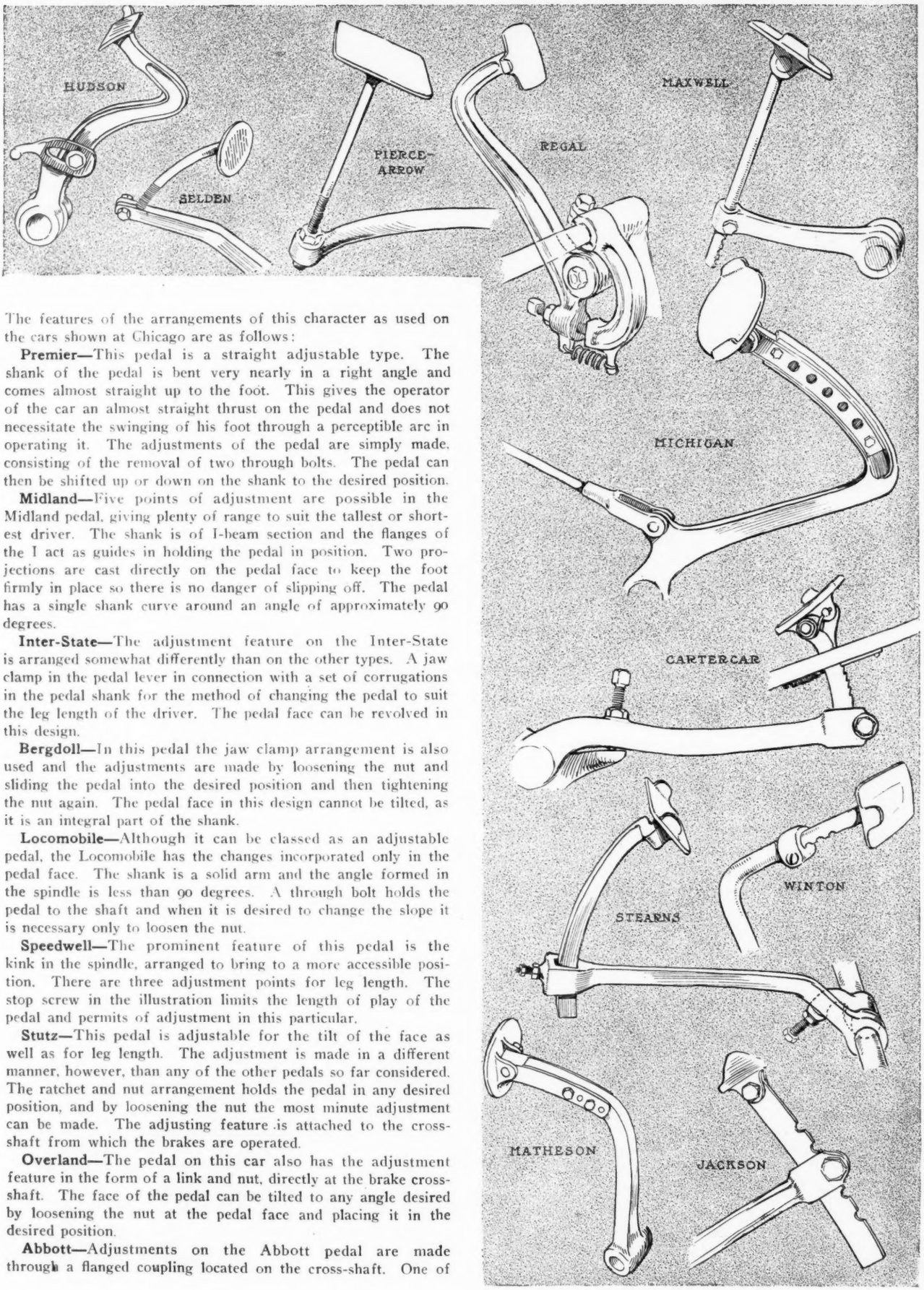
Adjustable Pedals Insure Comfort to Both the Long-Legged Man and the Man with Shorter Reach

DURING the past season it was surprising to note the many little refinements which were made in the way of added comfort for the driver and other occupants of the cars brought out for 1913. One of these refinements which shows how considerate of the driver the American automobile manufacturer is becoming, now that the principal details of design are more nearly approaching standardization, is the adjustable feature for clutch and brake pedals. The purpose which this serves is two-fold; it permits the raising or lowering of the pedals to accommodate persons who, from preference or on account of physical peculiarities, require either more or less leg-room than is usual; it also gives a more flexible adjustment on the clutch and brake, for by changing the pedal the amount of effort needed to operate them, as well as the application of that effort to the parts, may be varied considerably.

The different designers, engineers and manufacturers have gone about the task of making the pedals of their respective cars adjustable in several ways. Some, of course, have not considered the matter of sufficient importance or the adjustable feature an advantage great enough to be worth the trouble of changing their design in this respect, if they had no such provision. Others, who do not claim to build cars for the owner-driver, give this feature no attention, claiming that as long as the cars are to be driven by professional chauffeurs it is of no consequence, as the chauffeur is not particular about such minor matters. The majority of the makers, however, thought that the adjustable pedal was a factor not to be neglected in campaigning for business in 1913 and included some form of adjustment in their cars for the season.

The methods employed to make the pedals adjustable on the different makes of car are various, as may be seen from the accompanying illustrations. Most of these are simple, though there are a few which embody more complex features. Of course, the shape of the pedal shank and the size of the space in which it operates determine to a certain extent the principle and construction of the adjusting device on the various cars.

While the pedal adjustments illustrated herewith do not include those of every American automobile, they represent the efforts of the engineering staffs of many of our leading passenger car factories in this detail of construction as well as of those of several well-known commercial vehicle manufacturers.



The features of the arrangements of this character as used on the cars shown at Chicago are as follows:

Premier—This pedal is a straight adjustable type. The shank of the pedal is bent very nearly in a right angle and comes almost straight up to the foot. This gives the operator of the car an almost straight thrust on the pedal and does not necessitate the swinging of his foot through a perceptible arc in operating it. The adjustments of the pedal are simply made, consisting of the removal of two through bolts. The pedal can then be shifted up or down on the shank to the desired position.

Midland—Five points of adjustment are possible in the Midland pedal, giving plenty of range to suit the tallest or shortest driver. The shank is of I-beam section and the flanges of the I act as guides in holding the pedal in position. Two projections are cast directly on the pedal face to keep the foot firmly in place so there is no danger of slipping off. The pedal has a single shank curve around an angle of approximately 90 degrees.

Inter-State—The adjustment feature on the Inter-State is arranged somewhat differently than on the other types. A jaw clamp in the pedal lever in connection with a set of corrugations in the pedal shank for the method of changing the pedal to suit the leg length of the driver. The pedal face can be revolved in this design.

Bergdoll—In this pedal the jaw clamp arrangement is also used and the adjustments are made by loosening the nut and sliding the pedal into the desired position and then tightening the nut again. The pedal face in this design cannot be tilted, as it is an integral part of the shank.

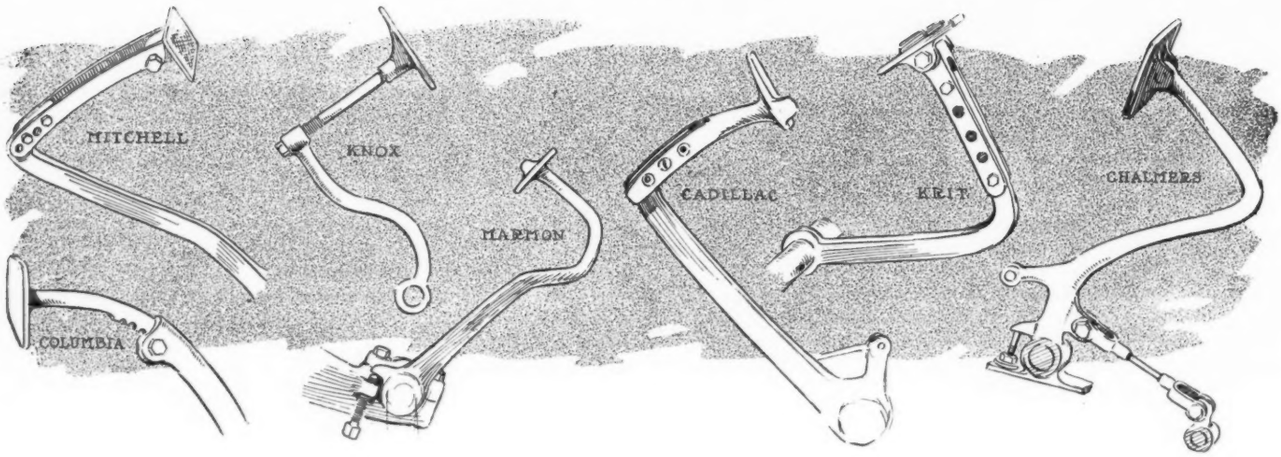
Locomobile—Although it can be classed as an adjustable pedal, the Locomobile has the changes incorporated only in the pedal face. The shank is a solid arm and the angle formed in the spindle is less than 90 degrees. A through bolt holds the pedal to the shaft and when it is desired to change the slope it is necessary only to loosen the nut.

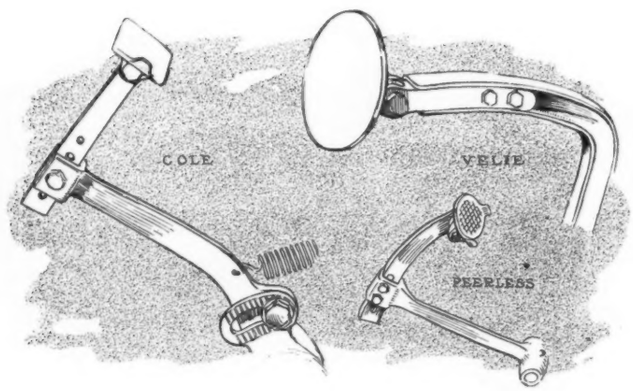
Speedwell—The prominent feature of this pedal is the kink in the spindle, arranged to bring to a more accessible position. There are three adjustment points for leg length. The stop screw in the illustration limits the length of play of the pedal and permits of adjustment in this particular.

Stutz—This pedal is adjustable for the tilt of the face as well as for leg length. The adjustment is made in a different manner, however, than any of the other pedals so far considered. The ratchet and nut arrangement holds the pedal in any desired position, and by loosening the nut the most minute adjustment can be made. The adjusting feature is attached to the cross-shaft from which the brakes are operated.

Overland—The pedal on this car also has the adjustment feature in the form of a link and nut, directly at the brake cross-shaft. The face of the pedal can be tilted to any angle desired by loosening the nut at the pedal face and placing it in the desired position.

Abbott—Adjustments on the Abbott pedal are made through a flanged coupling located on the cross-shaft. One of





the flanges is keyed on the shaft and the other is a unit with the pedal, so that in operating the pedal the push is transmitted through the bolts.

Hudson—The nut and link type of adjustment is used on this pedal. As will be seen in the illustration, the nut is loosened and the pedal moved to the point in the link that is desired and the nut then tightened. The link and washer are corrugated to make a firm and permanent adjustment.

Selden—A screw adjustment is used on this pedal with a clamp nut to act as a lock. The clamp nut is loosened and the entire pedal shank, which is threaded, is turned down until it is shortened to the desired length.

Pierce-Arrow—This pedal is also a screw-down type, having the spindle threaded and passing through the tapped piece in the pedal lever. The locknut in this case is directly on the threaded spindle. The spindle is a straight cylindrical piece with the pedal face mounted on top, resembling very much a poppet valve in appearance.

Regal—Even the pedal is underslung on this car. It passes below the pedal transverse shaft. The adjustments are taken up on a stop screw and locknut. The stopscrew passes through a boss on the bottom of the pedal.

Maxwell—In speaking of the straight-shanked adjustable pedal, that used on the Maxwell should be noted. This pedal instead of using the screw-down adjustment has a number of corrugations in the shank.

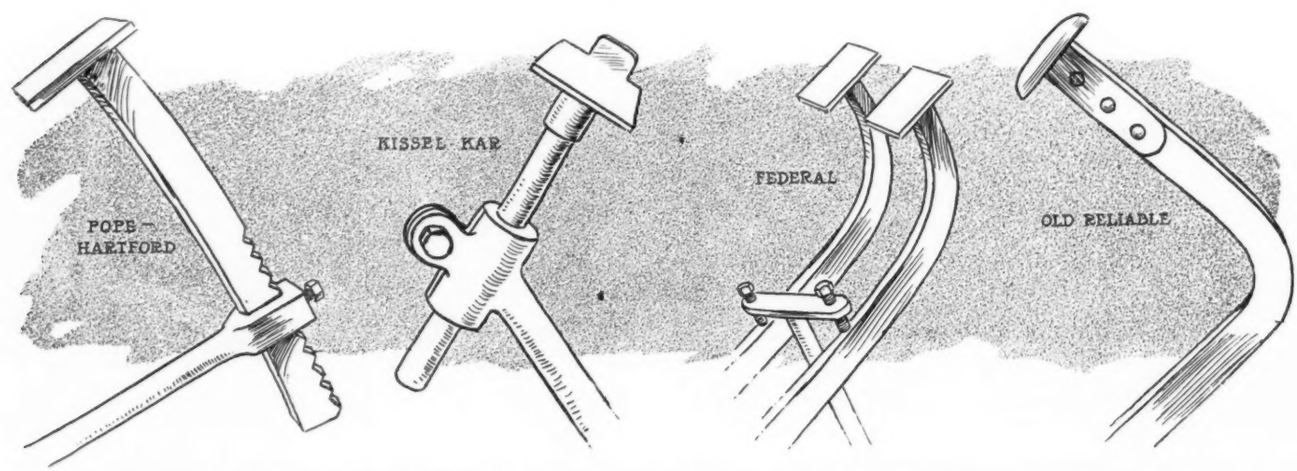
Michigan—A straight two-bolt adjustment feature is used on the Michigan pedal. This is one of the right-angle shank type and has the brake rod attached above the fulcrum.

Cartercar—Two adjustments are employed on the Carter pedal, one for the shank and the other for the pedal face. The throw of the shank and its position is determined by a set screw near the cross-shaft and the slope of the pedal face is determined by the position of a ratchet and pawl.

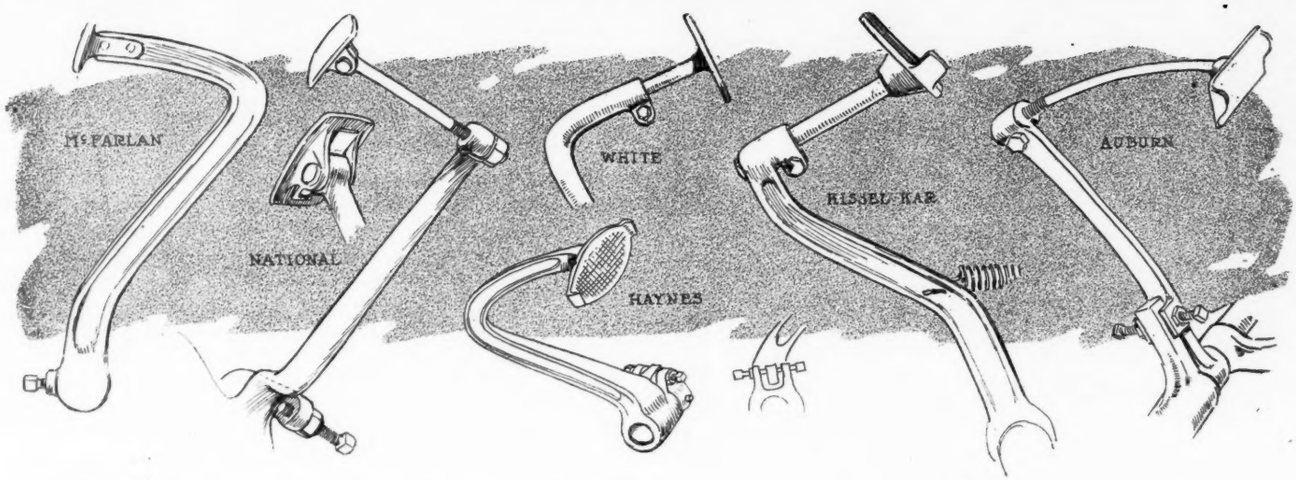
Winton—The Winton pedal is unique on account of the sheaf into which the shank fits. By loosening the screw through the pedal arm the shank can be moved in or out of the sheath as desired.

Stearns—On the Stearns cars, the pedal shank can be moved in and out but instead of a sheath they pass through a squared opening in the pedal arm. The position of the pedal in the arm is fixed by a set screw. A kink in the shank brings the pedal slightly farther to the left than if a straight shank were used.

Matheson—On the Matheson adjustable pedal, the shank fitted down over the lever and the bolts went through both



The pedals shown above are sketches made from motor trucks, as are those at the bottom of the opposite page



sides of the shank flanges and through the shaft of the pedal.

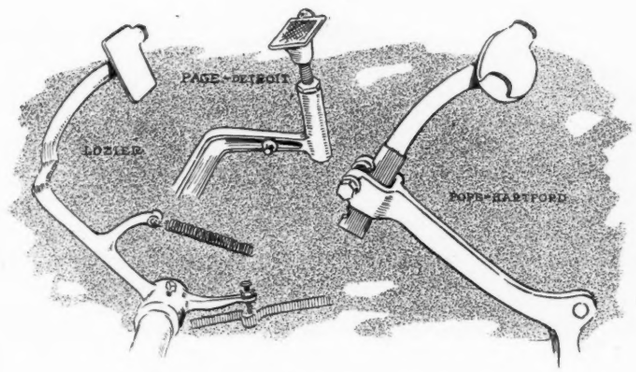
Jackson—The shank of the Jackson pedal is a straight bar with corrugations. The corrugations are held by a bolt which passes through the jaws at the end of the pedal lever. The adjustments are made by removing the bolt and sliding the desired corrugation into place.

Mitchell, Cadillac, Krit, Velie, Peerless, Cole—These six cars are all users of the popular bolt adjustment pedal. The shank is fastened to the brake lever by two through bolts which also make the adjustment lock. This type of pedal gives considerable variation as to length and is readily accessible. The adjustment feature is cheap to manufacture and is durable.

Knox, National, White, Kissell, Auburn, Paige—On these six cars the end of the brake lever forms a socket for the shank to fit into. The shank is threaded and screws into the tapped socket in the brake lever. The pitch of the threads is not very steep and in this way the adjustment secured by turning the pedal through one revolution is close enough for all practical purposes. The adjustment at this point is merely for the sake of taking enough space to compensate for the different leg lengths of the drivers. In some of these designs, as the White, for instance, the pedal head is a unit with the shank, while in other designs, as the National, the head rests upon a bolt which forms a pivot and allows the slope of the pedal to be adjusted.

Marmon, Chalmers, Lozier—On these pedals the length of the shank is not adjusted, but the position of the pedal itself can be changed by regulating the set screw. By changing the position of the pedal there is a slight compensation made for the leg length of the driver, because the lost motion of the pedal is diminished.

Columbia, Pope-Hartford—On both these pedals the length of the spindles is regulated by notches. In one case the notches

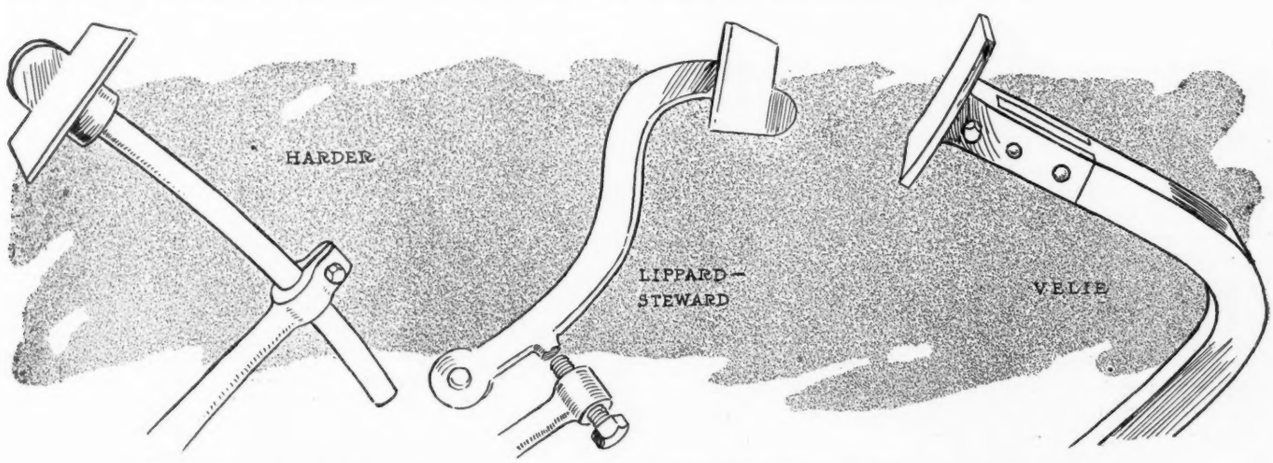


are on the bottom of the shank and on the other they are on the top. The principle is the same, however, and both are regulated by removing the bolt and slipping the next notch or corrugation in place.

McFarlan, Haynes—These are two examples of solid-shanked pedals with the pedal face removable. The lengths of these spindles are non-adjustable but the play is regulated by set screws.

Truck Pedals

At the bottoms of these pages are shown the variety of pedals used on trucks. It will be noted that all types are represented here as well as in the passenger cars. The notched shank is used by the Pope-Hartford, the sliding socket by the Kissel and Harder. Federal uses double set screws, variable length by bolt adjustment is on the Old Reliable and Velie, and Lippard-Stewart adjusts with a single set screw.



Three types of pedal shank curvature, the straight, S-type and right-angle, all used on commercial cars

CAR REPORT

Model ..... Car No. ..... Motor No. .....

SOLD THIS DAY TO

Name .....

Street Address .....

Town or City .....

COLT-STRATTON CO.

Date ..... 19 Per .....

Fig. 1—Car sales report used by Colt-Stratton salesmen

Salesroom Work Forms

Blanks Used for Making Sales Department's Work Simple and Sure—Points on Garage-Building Form

AUTOMOBILE sales, like repair and service departments, constitute a regular part of the industry's business, and as such are subject to kindred if not the same conditions and laws as the work in the establishments mentioned. Here as well as there, it is only through strict economy that a liberal profit may be obtained, which is not only dependent upon the volume of trading done, but also upon the least possible quantity of work connected with the doing of this business. Other influences which have a bearing, although indirectly, upon profit, are reliable, prompt attention to orders, carrying out of these with the least expense and attracting customers and attending to them in the most pleasing fashion possible.

It is therefore small wonder that automobile sales organizations, which formerly held that their end of the business was more subject to personal conditions than that of the designing and shipping departments of the factory, for example, are now taking to regular systems which govern all the routine work, and as there is a certain amount of routine even in the most personal work of the salesman, system has entered his most intense work. While it would be absurd to attempt standardizing salesmen's talk throughout, putting it on a basis with the telephone operator's conversation, a slight advance in this direction is being made, by using salesmen's conferences, where the most suitable processes for approaching and cultivating prospects are taken up. However, all brainy sales managers are careful in not impressing standard language upon their staff men, but rather try to imbue them with an advantageous, profitable way of thinking, which must have the desired effect upon the average prospect.

Sales Department Like War Organization

In this way the sales department is conducted much on the same basis as a regiment in war, when instructions are given from the head officers to the lower ones who carry them out. That these lower officers happen to have men under them to work with does not alter the situation substantially, but merely introduces a number of variables which cannot be avoided, and are a detriment to the war business manager in direct proportion to number. In this respect the sales manager with his staff of executing soldiers has the advantage of the military man.

However this be, it is necessary that the headquarters of a sales organization be kept informed of all the doings of its salesmen, and for this reason many prominent sales companies have introduced and are still introducing systems for the salesmen who have to report each call made on any prospect and each sale closed, just as soon as this is done. In this way the organization is kept posted on all happenings, and if by chance a salesman should be prevented from following up an appointment or the like, another man can be pushed in his place immediately and no business loss to the firm results from the disablement—so to speak—of one man.

Systems treating with this phase of the sales situation have been described in the pages of THE AUTOMOBILE now and again, and to complement these systems a few other blanks used by the Colt-Stratton Co., Cole distributors in New York City, are here shown. There are five forms which will be described in the order of their application.

Whenever a car is sold by a salesman, he writes the name and address of the purchaser upon a card, Fig. 1. If the car is in stock the model, car number and the number of the motor are entered on the card by the member of the sales organization who selects the car to be delivered. The date of the sale is also written on the card, and the man who O.K.'s the sale signs it before sending it to the person in charge of the stock of new cars at the company's garage. The latter then carries out the order, and the car having been delivered in due course, the card is signed by the man who held it last and is returned to the sales office of the manager and there filed.

Order Form for Cars for Dealers

As the Colt-Stratton Co. is the representative of the Cole concern in the large territory known as the Metropolitan, there often arises the necessity of sending cars to dealers who are subordinate to the New York concern. In this case, unless the shipment of the car is of immediate need, the New York Office communicates with Indianapolis, sending a special order, Fig. 2, known as the distributor's order. This blank, here shown, is 8.5 by 11 inches, a yellow original being filled out for the factory, while a carbon copy on white paper is retained in New York. All distributors' orders are numbered, in rotation, and the number is entered at the head of the sheet, where the date of when the blank is filled out and the date when the car should

DISTRIBUTORS' ORDER BLANK

No. .....

Date ..... 191..

COLE MOTOR CAR COMPANY
Indianapolis, Indiana

Shipping date ..... 191..

GENTLEMEN:

Please finish and equip one Cole Motor Car as specified below and ship in accordance with the terms of our contract.

DESCRIPTION OF CAR	LIST PRICES	NET PRICES
Model ..... Tread ..... Color		
Tires, kind ..... (See reverse of sheet for list of Models, Tires, Etc.)		
Mohair Top and Dust Hood		
Wind Shield		
Speedometer		
Auxiliary Seats (for Models 50 and 60 only)		
Cravenette Seat Covers		
Extra Tire and Cover		
..... Less ..... per cent. Discount		

Draw through .....

Ship above car to .....

Routing via .....

Charge to ..... Distributor

By .....

COLORED ORIGINAL TO BE MAILED TO FACTORY. WHITE COPY TO BE RETAINED FOR FILES.

Fig. 2—Cole distributors' order blank for dealers' cars

be shipped are given. Then follows a detailed description of the car and its equipment, list and net prices for each part to be charged in this case being enumerated. The shipping directions, including the address of the dealer to whom the car is to be shipped, are given on the bottom of the sheet. The sales manager signs the order before the same is mailed to Indianapolis. This form being used for Cole main distributors all over the country, is not imprinted with the name of the Colt-Stratton Co.

On the reverse of the distributor's order appears a listing of all the yearly models made by the Cole company. This serves for the information of the dealer making out the order, so as to prevent all errors on his part and consequent rectifications which prove costly both in regard to time and money spent. These yearly model tips, as they appear on the back of the blank, are seen in Fig. 4.

Record Slip Used for Each Deposit

Another nice detail of the New York company's system is the use of a deposit slip, which is made out whenever money is received from customers. By the use of this slip a lot of possible confusion may be averted. The slip, Fig. 5, is 3 by 5 inches, printed on thin white paper. Whenever a customer's check is prepared for deposit at the bank, such a slip is filled out with the date, the amount of the check, the name of the customer and the number of his check. In case the check is part payment on a car, the amount of money written on the account of the customer, the advance deposit paid and the balance still remaining unpaid are also written on this slip.

This may seem a simple and unimportant sort of blank, but in a large business is of considerable help in keeping affairs straight and avoiding useless bother of customers, etc., which can only result in detriment to the company, which to avoid is the purpose of the system.

Every day when the deposits of money in the company's bank are made, a daily statement, Fig. 3, is filled out. This form is 8.5 by 11 inches and printed on thin white paper. Total receipts and disbursements for the day are given on the top half of the form, while the bottom gives the account of the various banks

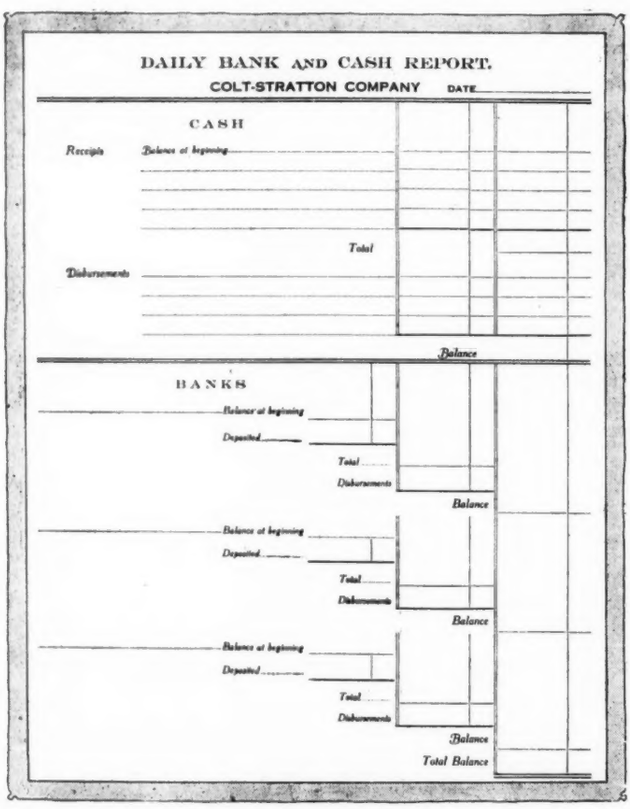


Fig. 3—Blank of Colt-Stratton Co.'s daily cash report

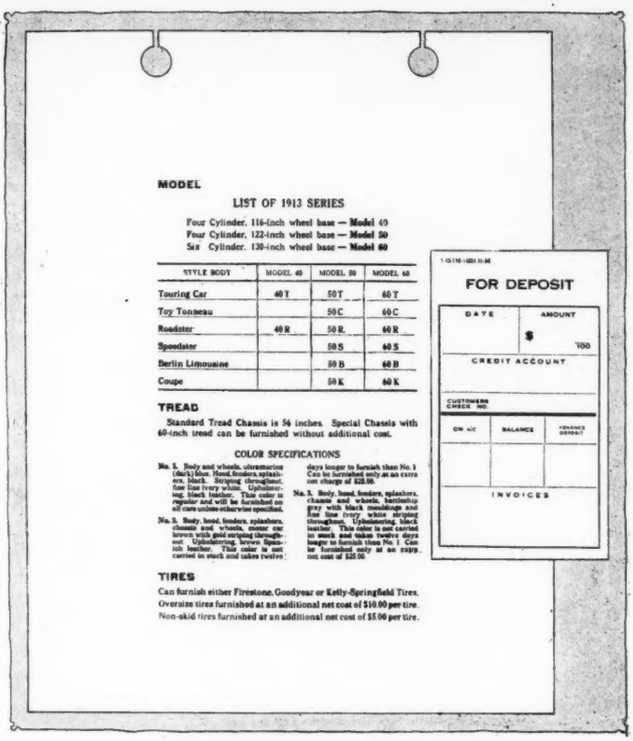


Fig. 4—Back of dealers' order. Fig. 5—Deposit slip

and the money subsequently deposited in addition to them. A total figure may be easily calculated, and by this simple system the company is enabled to oversee its entire holdings of cash as well as the in and outflow of money in the business. Which is, of course, a very important detail, or rather, not a detail at all, being the expression of the degree to which the purpose of the business is being realized from day to day.

The Shape of the Garage

In the construction of a garage, especially in a city, the object is of course to be able to house as many cars as possible on the ground at the disposal of the operator. Depending on the shape of the property is the shape of the garage, and as a rule the full ground afforded is used for the building. If the ground is square or rectangular, the garage built on it will in ninety-nine out of 100 cases be square or rectangular, respectively.

While in the case of a long rectangle the best plan is indeed to build the garage to occupy the full space of the lot and to arrange the cars in long rows with free passages between these and running all along the length of the building, in the case of a square lot the square building is not the best way of using the property. The best way, let it be said, is the use of the ground for a circular garage, with the diameter equal to the side of the square lot. This will be proved at once.

Suppose a man wants to build a garage on a lot 80 feet square. The building is to be two stories high. If he builds a square garage, he will lose a space of about 10 by 14 feet in one corner of the building by the elevator and about 20 by 65 feet in the other by the office, lavatory, etc. The rest of the ground floor will be at his disposal for storing cars, excepting a central space through which they must pass to the door or elevator. If he can get 16 cars on the floor, he will have made a good job. On the second floor, where a small repair shop is kept, he may be able by close arrangement to place as much as 35 cars, but in this case a good many spaces will be good for nothing but dead storage, as part of the cars will be very difficult to move. This gives a total space for 51 cars in the building.

If the garage is built in the form of a round tower, with a round elevator carrying a turntable, in the center, the cars can be disposed in two concentric circles, moving to and from the elevator in radial lines. This gives ample space for 32 cars on the ground floor and perhaps even more on the second. At any rate, a capacity of 64 cars for the building is easily obtained, so that the income is higher than with a square building.

On the other hand, the material needed for building a round house is much less than for a square one, the ratio of material required being 6.28 to 8. In many respects the construction is easier, and there can be said to be an all around saving.

The Rostrum

In which Letters from Readers Are Answered and Discussed

Owners Discuss Location of Gearbox

Low-Tension Magneto Ignition Fails—Motor Knocks While Laboring on High—Fischer Motor Uses Slide Valves—Rusty Radiator Gives Trouble

Considers That the Amidship Location of the Gearbox Is Most Advantageous

EDITOR THE AUTOMOBILE:—The writer is much interested in the discussion going on in your columns at the present time relative to the location of the change gears.

I have driven various makes of cars with all three of the most important locations, that is, as a unit with the motor, amidships and as a unit with the rear axle. In my experience I believe the amidship location to be far more practical than the others and a unit with the motor system next. The rear axle location with the transmission not only presents serious disadvantages from the point of view of traction on any surface except with a smooth surface such as asphalt, but it practically precludes the employment of a four-speed transmission, unless some special type be evolved which is, in many people's estimation, sufficiently good to cause its use on a car of any pretension.

I do not care to dwell on the serious disadvantages of added unsprung weight on the rear axle, as this was fully brought out in your columns, but I believe that the inability to have more than three speeds without great weight and bulk should be brought out strongly against this construction. As to the decrease in noise resultant from this insulation from the body in the rear axle system, this is more apparent to the driver than to the rear seat passengers, as is at least the case with one well-known make, due probably more to the disposition of the bearings of the transmission than to any great inherent merit of this type. The shortening of the propeller shaft in the amidship location is not very great if properly constructed and this type is entirely free from any liability of injury from distortion and avoids undue concentration of weight.

Boston, Mass. R. C. TAFT.

¶ *In answering this question car owners are directed to the fact that one of the leading arguments advanced against rear axle location is that of increased axle weight and consequent tire damage. Definite information on this line would be in order.*

¶ *Those not in favor of the amidship location have urged against its lack of accessibility.*

¶ *The gearbox as a unit with the motor has been criticised in that it is not suitable for a heavyweight car because of the fact that too much weight is placed in front.*

Magneto Delivers No Current

Editor THE AUTOMOBILE: I own a 1911 Mitchell 30 which has caused me a great deal of trouble lately because of the magneto. It is a Splitdorf magneto. The engine runs all right on the battery but will not run on the magneto. I have had some new wires put in and the platinum points filed down. Can you explain what the trouble is from the information I have given?

Forman, N. D. D. J. JONES.

—If your magneto is correctly adjusted and the wiring is good, the trouble is probably in the transformer coil, which no doubt is short circuited or broken down. The magneto used with the Mitchell car is of the low-tension type. The armature has but one winding and delivers a low-tension current. The current passes from the magneto through the transformer coil, where it is raised to a sufficient voltage to jump the spark gap at the plug. In all probability the trouble is in this coil. It often happens that part of the windings on the coil are broken down, or, in other words, not insulated from one another. The coil then fails to deliver a current of sufficiently high voltage to jump the gap at the plugs.

As far as the repair goes, the only advice which can be given is not to try it yourself. It takes an electrical expert with the proper facilities to do the work. You can have the coil sent back to the factory and repaired at a very low cost and you will then be sure that it is right.

Lean Mixture Causes a Pop Back

Editor THE AUTOMOBILE: Two or three issues back some man gave an account in THE AUTOMOBILE of chemical composition of camphor and explained that it could not be of much value when dissolved in gasoline for automobile motors. Last week The Rostrum said it will add materially to combustion and power, but may injure the cylinders. Will you please say whether you recommend its use or not and in what proportions to gasoline?

2—Why does a lean mixture cause a motor to knock or pound when pulling hard on slow speed?

3—Is the Harroun kerosene carbureter on the market? What is the price, and can it be installed on 69T Overland? Please give an address where it can be purchased. An article in THE AUTOMOBILE for July 31 said kerosene will not carburet properly when mixed with gasoline or words to that effect; what do you say?

4—Is there still a larger tire than 33 by 4 that will fit 32 by 3.5 rims?

5—Would you advise connecting the auxiliary air opening on a Schebler carbureter to exhaust pipe for hot air?

Inman, S. C. G. C. F.

—1—The Rostrum does not recommend the use of camphor or any other fuel "dope" that has as yet become well known. Camphor carbons the cylinders and is also apt to rust them unless they are amply protected by copious lubrication. It also deposits

carbon. Picric acid attacks the cylinder wall, as does ether also.

A few weeks ago the Automobile Legal Association of Boston, Mass., sent out a notice, a reprint from *The Motor* of London, telling of results from using camphor in gasoline, leaving it to the members to try it or not, but asking for a report. As a result of this reports began to come in and the association has just sent out the following statement relative to the matter: "During the past week we have had a great many reports from our members concerning camphor in gasoline, and all report that they have carbonized cylinders as a result of its use, and that the slight gain in power has been more than offset by the disadvantage of carbonizing. The use of camphor in gasoline therefore cannot be recommended."

2—The action of the motor with a weak mixture on low speeds is due to the extreme irregularity of the explosions. The mixture is not of the right proportions to fire regularly, and as the momentum of the car quickly diminishes under these circumstances, every mill in the cylinder will cause the motor to strain and labor much more than it would were the explosions coming regularly. Much of the irregularity of action is in the clutch and drive members of the car owing to the jerking of the motor when firing irregularly. Even when there is no misfiring the length of time between the explosions is great enough to cause the momentum to drop and cause the same kind of knock as when the spark is too far advanced. The strain on the motor is very bad under these conditions.

3—The Harroun carbureter is now on the market and can be purchased from the Ray Harroun Co., Tenth and Canal Streets, Indianapolis, Ind. The price can be ascertained from this company. The carbureter is applicable to the Overland car. Kerosene and gasoline will not carburet as satisfactorily as a homogeneous mixture.

4—A 35 by 4-inch tire will not fit your rim. The largest oversize for a 32 by 3.5-inch is a 33 by 4-inch tire.

5—In cold weather it would probably have beneficial results but in warm weather it would be better without.

Interested in Fischer Motor

Editor THE AUTOMOBILE: Would you kindly publish in THE AUTOMOBILE a drawing of the Fischer motor as mentioned in THE AUTOMOBILE dated July 24, 1913.

Mount Vernon, N. Y. J. F. B.

—A full description of the Fischer motor was published in THE AUTOMOBILE for December 19, 1912. In this issue there were several sectional and part views given. The illustration shown in Fig. 1 is reproduced from that article.

This motor has as a substitute for poppet valves two slide valves V disposed oppositely in the cylinder walls, Fig. 1. These slide valves are crescent-shaped in cross-section and operate in crescent-shaped recesses V1 in the opposite sides of the cylinder bore, which, by the way, is not a circle, but an irregular figure composed of approximately two nearly semi-circular parts connected by two crescent-shaped parts. These slide valves occupy each approximately 69 degrees of the cylinder wall circumference. They are of cast iron, and extend the entire length of the cylinder, and approximately 2 inches below it. At their lower extremities they carry slots for the engagement of the operating mechanism consisting of box cams, the shafts of which are driven by Coventry silent chains from the crankshaft, thus insuring positive reciprocation in both directions and entirely dispensing with the use of springs, thus giving silent action.

The reciprocation of the sleeves is such as to give the following timing:

Inlet opens 11 degrees after upper dead center.

Inlet closes 71 degrees after lower dead center.

Exhaust opens 63 degrees before lower dead center.

Exhaust closes 19.75 degrees after upper dead center.

The timing is thus not standard as the intake and exhaust overlap approximately 8 degrees, which is claimed to give additional power. With this timing and with a peculiar box-cam construction of the actuating mechanisms there is obtained a characteristic long dwell after the closing of the ports, so that the slide valves are at rest during the compression and power strokes. The dwell on compression is 149 degrees. The exhaust is opened for 262 degrees.

The motor is a four-cylinder monobloc type, with a bore and stroke of 3 5-16 and 4 3-4 inches; to be more exact, 85 by 120 millimeters. It has thermosyphon cooling, splash and force-feed lubrication, and high-tension ignition. To this extent the motor is entirely conventional. The special features which make it interesting as compared with other motors are its valve mechanism and its small clearance volume.

From Portsmouth to Harper's Ferry

Editor THE AUTOMOBILE: I am thinking of taking a trip from Portsmouth, O., to Hamden, O., and from Hamden to Parkersburg, W. Va., and from there to Harper's Ferry, W. Va. This route is along the Baltimore and Ohio Railroad, and I would like to have all the information possible in regard to the distance and condition of the road.

Portsmouth, O. J. HOWARD SUTTON.

—This is unrouted country and you will have to depend entirely on local direction. The roads are fair in dry weather, but the distances are long on account of the necessity of winding about. The roads are below the average of those found through the rural districts of Ohio.

Troubled by Rusty Radiator

Editor THE AUTOMOBILE: 1—I would like to know what will keep my radiator from rusting. When letting the water out it is full of rust. I drain it often but when the water gets hot I have just as much rust. If there is a mixture of some kind, please tell me how much and how often to use it.

2—Does it make any difference whether hard or soft water is

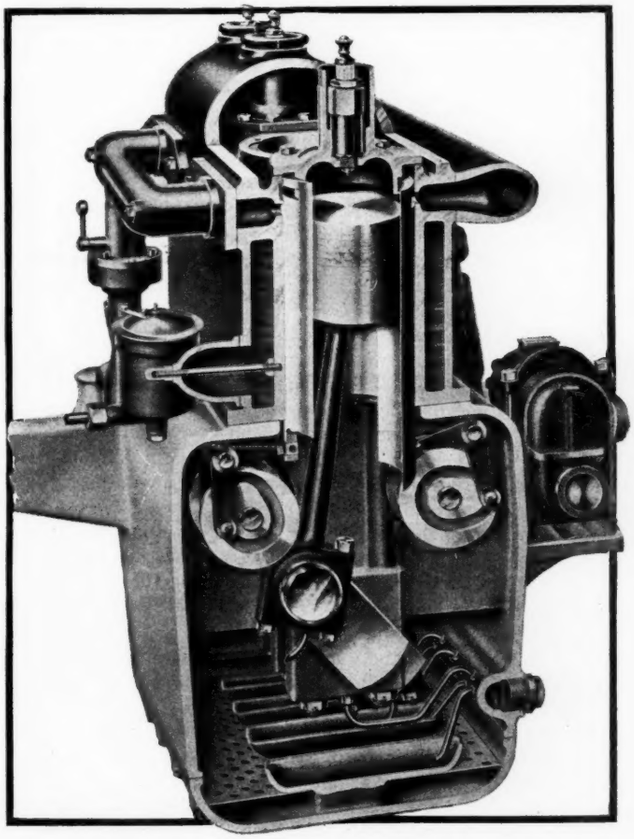


Fig. 1—Section through Fischer slide-valve motor

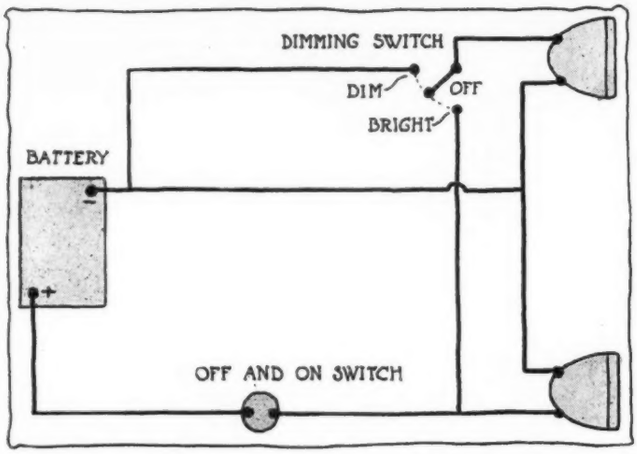


Fig. 2—Method of dimming headlights by switching to series connection

used? I am using soft water thinking that it is the best.

3—I have no priming cups on this engine. By pouring kerosene in the carbureter and cranking, will the engine while hot throw kerosene around on the walls?

4—How often should this be done and how much at a time?

5—Is it all right to have one person pour the kerosene in while another cranks the engine?

6—I am having continuous trouble with leaves in the rear spring breaking. They don't break suddenly but a little at a time. I have placed the springs in the middle of the blocks, with a close fitting leather under each spring and clips kept tight. I have a Hoover compound shock-absorber and rebound strap with tension enough to keep the slack out of the straps. It is an eight-leafed spring. Car model 54 Rambler 1910. The 7200 miles that this car has traveled, I have spent more for spring leaves than any other repair on the car. The springs were greased with graphite and oil. If you have any remedy that will prevent this continuous expense please tell me of it.

7—The side and tail lights on this car are electric, connected by one switch. In burning the tail light can it be burned separately by unscrewing the side lights? If not, what wiring would I have to put on to burn the tail light alone?

Buffalo Gap, S. D. JOHN H. ENGLEBRECHT.

—1—The Rostrum does not recommend the indiscriminate use of any radiator compound, because while there are some good solutions on the market for keeping the scale from the radiator, there are many others that are nothing more than the ordinary boiler compound which is powerful enough to eat up the metal of a boiler. It is the scale that causes the radiator to become inefficient and not the slight amount of rust that will occur in a good copper radiator. The probabilities are that your cooling system is not clean. It would be a good plan to clean it out by the recipe given in these columns, namely, to dissolve a couple of handfuls of common washing soda in a pail of boiling water and run it through the cooling system for a couple of minutes. The engine can be run for 2 or 3 minutes. The radiator and the cooling spaces should then be flushed out by using pure water. If the water comes out very dirty use more of the soda in the same way and keep it up until the water comes out fairly clean. If you are using pure water it should be sufficient to clean the radiator every 5 or 6 months.

2—Soft water should be used. It is the lime in the hard water that causes the scale to form on the radiator and cuts down its efficiency.

3—This is not the way to put kerosene into a motor. The kerosene would fall down into the carbureter and you would have to drain it out to start unless your motor was hot enough to vaporize the kerosene. The correct method of getting the kerosene into the cylinder would be to pour it slowly into the air opening of the carbureter while the motor is running. The kerosene will then be carried up into the combustion space in its liquid state and will there aid in the dissolving of the carbon. If the air intake of the carbureter is arranged in such a way that the kerosene cannot be poured into it while the motor is running, wait until the engine is hot, after a day's run, and then remove the sparkplugs and pour the kerosene in the spark-plug holes.

4—If you remove the plugs and put the kerosene in after each run, use about two tablespoonfuls.

5—The plug method is better. But do this only when the motor is hot.

6—The makers of the Rambler car found that the eight-leafed spring was a little light for the rear of the car and changed it to a nine-leafed spring. The first cars of this model were made with nine leaves in the right spring and eight leaves in the left. This was afterwards increased to nine leaves on both sides. You should add another leaf to the spring. Insert it between the two largest leaves and have the other leaves ground off on a well-wet grind stone to make the gradual curve to the spring. This should prevent further trouble.

7—If the lights are connected in parallel they can be burned separately by removing the bulbs from the lamps that you do not care to use. You can tell this by removing the side bulbs. If the tail light goes out they are connected in series and you will have to change the wiring. You will have to reduce the voltage also to connect in parallel. To connect in parallel from a 6-volt line to 6-volt lamps for side and tail the diagram shown in Fig. 4 should be followed.

Waste Fuel Shown in Exhaust

Editor THE AUTOMOBILE—1—Some time ago I read an article in your publication stating that the wasted fuel could be determined by the amount of gases having fuel value that were contained in the exhaust. In that article, as I remember, the amount of fuel wasted varied very closely along the same proportions that the carbon monoxide bore to the total gases in the exhaust. That is, the percentage of wasted fuel could almost be determined by the proportion of CO present in the exhaust gas.

If this is true would it not be possible for a man who could make the analysis necessary to determine the percentage of carbon monoxide present in the exhaust, to determine whether the changes he made in the adjustment of his carbureter were bringing him closer or further away from the desired point?

2—Have any tests been made that could be set forth diagrammatically, say in the form of a curve the relationship of the proportion of CO in the exhaust to the amount of fuel wasted? If so, would you kindly show such a curve in The Rostrum?

3—What is the average terminal pressure of the gasoline motor as used in an automobile and developing say a rated horsepower of 30?

New York City. CURIOUS.

—1—It is perfectly possible by analysis to compute the effi-

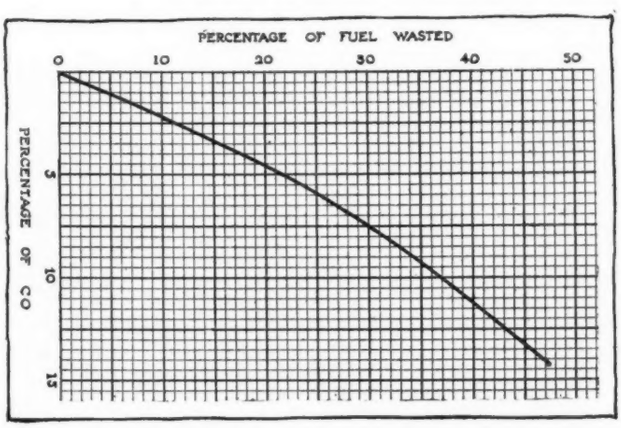


Fig. 3—Percentage of fuel wasted varies with the amount of CO exhausted

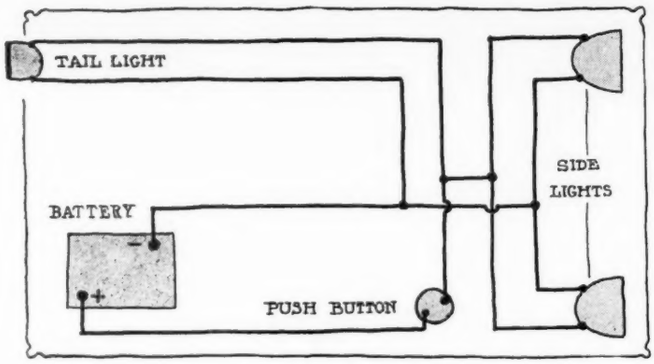


Fig. 4—Connecting side and tail lights in parallel so any bulb can be removed

ciency at which the motor is working by making accurate computations as to the calorific value of the exhaust as compared to the fuel fed to the motor. Such a test would have to run over a period of time during which a measured quantity of the fuel was fed to the motor and during which time the total value of the exhaust products was calculated. The ratio of the b.t.u. in the exhaust to the b.t.u. will give the percentage of fuel wasted. Since the CO is always found when the mixture is too rich, because there is not enough air supplied to burn the carbon to CO_2, the amount of CO will very closely show the wasted fuel through having too rich a mixture.

2—Such tests have been made and Fig. 3 shows a curve that has been compiled to indicate how the percentage of wasted fuel varied with the amount of CO.

3—When working with wide open throttle it is generally between 30 and 40 pounds to the square inch.

Switch to Dim Headlights

Editor THE AUTOMOBILE: Will you kindly inform me if there is any way of attaching a rheostat or other device on to the electric headlights of an automobile so that the lights may be dimmed but not fully extinguished? The car in question is a Buick 31, 1913, with Vesta electric lighting system.

Lebanon, N. H. CYRIL C. LAWLOR.

—There is a very simple way of doing this without the use of any such apparatus as a rheostat. All that is required is a little extra wire and a two-point-and-off switch. The wiring diagram for this system is given in Fig. 2. The idea of this system, as will be seen from the diagram, is the changing of the lamps from a parallel to a series connection. When they are connected in parallel each will be supplied with a 6-volt current and the result will be that they will burn with their designed candlepower. In the series connection the voltage will be divided between the lamps and with a 6-volt current each lamp will be supplied with 3 volts. This low voltage will be sufficient to just cause the lamps to glow faintly. They will be bright enough to act as side lights. The on-and-off switch can be used as a secret switch and concealed at some point to keep anyone from tampering with the electric lights. In ordinary running the dimming switch can be used.

Old Model Rayfield Shown

In the issue of THE AUTOMOBILE for July 17, on page 129, the method of making adjustments on the old Rayfield carbureter was shown. It must be understood that this illustration showed the former Rayfield carbureter which has been out of the market for more than two years. In order to avoid confusion the present Rayfield is shown in Fig. 5 and the method of adjusting it is as follows:

Providing no changes have been made in the adjustment, the motor will start after the carbureter is attached as it is approximately adjusted at the factory. Always adjust the carbureter with dash push button down. Close the needle valve by turning the low speed screw N to the left until the arm U slightly leaves contact with the cam M. Then turn to the right one and one-half turns, open throttle one quarter, prime the carbureter and start the motor. Close the throttle until the motor runs slowly without stopping. Turn the low speed screw to the left one notch at a time, until the motor idles smoothly. If the motor does not throttle low enough turn screw in stop arm to the left with a screwdriver. The carbureter is now adjusted for low speed.

Now open the throttle slowly until wide open. Should the motor backfire turn the high speed adjusting screw O to the right, a half turn at a time, until the motor runs without a miss. Should the motor not backfire, turn the high speed adjusting screw to the left until it does, then to the right until motor runs smoothly and powerfully. Do not use low speed adjustment to get a correct mixture at high or intermediate speeds. Should the motor backfire or the mixture be light at intermediate speeds (throttle about one quarter open) turn air valve adjustment P to the right a turn or two, thus increasing the spring tension and decreasing the quantity of air slightly. Remember that it is best to use all the air that your motor will handle without being sluggish.

Do not change the float level. It is correctly set at the factory. Always prime the carbureter well before starting the motor. Pull steadily on primer string. Don't jerk. Do not cut down the air supply, unless the gasoline adjustments fail to give you a powerful and fast mixture. If motor does not get the correct mixture at intermediate or high speed, do not try to remedy it through low speed adjustment. Remember the low speed adjustment is to be adjusted only when the motor is running idle. The Rayfield will operate well without heat, but the water jacket is put there for a purpose, and will materially improve the flexibility and smooth running of the motor. Therefore, always make the water connections.

In starting the motor, do not open the throttle more than one-quarter. The motor will start more readily with the throttle slightly opened, and it is harmful as well as useless to race your motor in starting. Before cranking the motor, pull dash button up. After the motor has warmed up, push the dash button down to running position. In stopping the motor, pull up the dash button, open the throttle about one-quarter and switch off the ignition, thus leaving a sufficient volume of rich mixture in the cylinders, which assures easy starting when the motor is again used.

—

THE EDITOR is in receipt of letters bearing no signature. These are held until the identity of the sender is known.

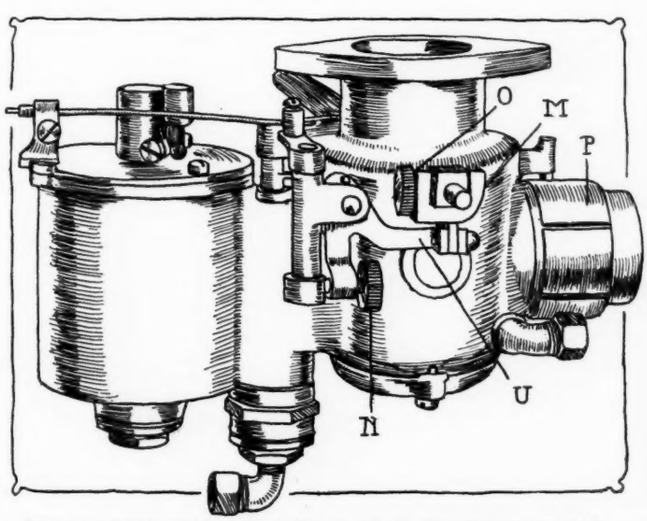


Fig. 5—Adjustment points on the model D, Rayfield carbureter

The Engineering Digest

Taximeters which Defy Tampering in Demand—Retarding Brake for Coasting—How Rivet Holes Should Be Made—Kobalt and Other High-Speed Steels Asserted in Three Classes—Benzol Carbureters—Silent Chain Adjustments

NEW Mechanism for Taximeters—The technical committee of the Automobile Club of France finds that the mechanical principle of the Seiman taximeter offers unusually strong guarantees of reliable operation and resistance to rough treatment or tampering. A flexible shaft is rotated from one of the vehicle wheels and its free end *a* is secured to a universal joint by means of the collar *b*, the split-cone *c* and the nut *d*, Fig. 1. The universal communicates rotation to the spindle *e* which turns freely in its bearing-sleeve and at its flattened top carries a roller *g* which is mounted eccentrically in relation to the axis of *e*, so as to communicate a to-and-fro movement to the fork *h* and to the pawl mounted upon this fork at its other end. The movement of the pawl turns a ratchet wheel *i* from which movement is transmitted to the other parts of the mechanism through the other ratchet wheels *i'*, *i''* and *i'''* which are all mounted on the same shaft with *i* and in one piece with it. If there is no resistance, the ratchet wheels turn backward with the pawl as well as forward, but if an oppositely-acting pawl is brought into action on any one of them, the forward movement of all of them will be determined by the amount of backward movement the oppositely-acting pawl will allow, and this will depend upon the number of teeth on the ratchet wheel upon which it takes effect. If, for example, the object is to cause the ratchets to make one full turn for 60 turns of the flexible shaft and the roller has an eccentricity which makes the fork *h* oscillate over an arc of about 10 degrees, this arc will correspond to less than 2 teeth of a ratchet wheel which has 60 teeth, and the counterpawl, acting on this wheel with 60 teeth, will permit it to turn forward only at the rate of 1 tooth for each turn of the roller *g*; that is, one complete revolution for 60 turns of the flexible shaft. This may correspond to one of the rates at which the taximeter should be operated, but taximeters must have more than one rate. The higher rate may require one revolution of the ratchets for 40 turns of the flexible shaft. This means that a ratchet wheel with 60 teeth should advance at the rate of 1½ tooth for each oscillation of the driving-pawl, and this rate can be produced by having 60 teeth on 2 of the wheels with the teeth on one of them opposite to the intervals between the teeth on the other and using 2 counterpawls acting alternately. As the roller and fork make the wheels advance between 1½ and 2 teeth at each movement—the same as for the lower rate—one of the counterpawls will always drop into engagement at a distance of 1½ tooth from the previous point of engagement. The adjustment to be made in order to apply the higher rate, after having previously applied the lower one, consists only in releasing an extra counterpawl.

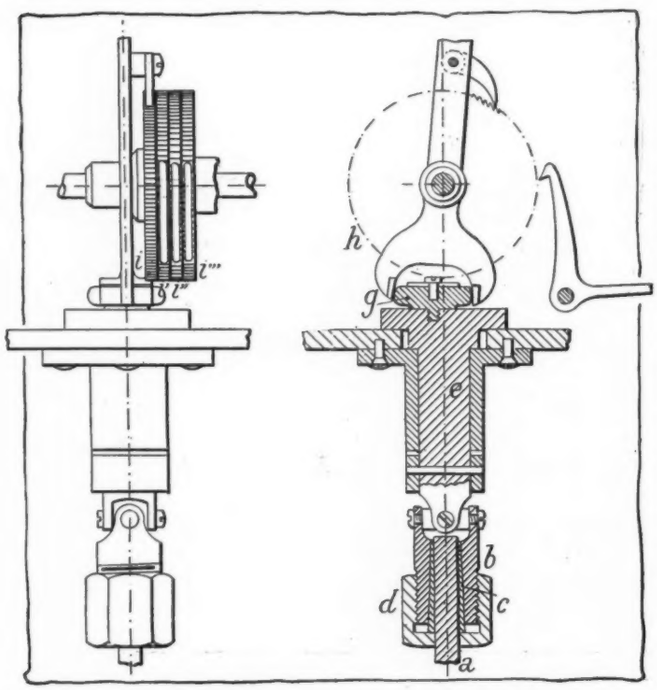


Fig. 1—Drive of the Seiman taximeter

The ratchet wheels transmit their movement to the indicator organs of the meter by means of ratchet wheel *a* and pawl *b*, as shown in Fig. 2. The spindle of *b* is secured in the disk *c* and is formed with a small arm *d* which rests on disk *e*, in which position the pawl is operative and the mechanism ready to function. By displacing disk *e* on its shaft, pawl *b* is raised and the driving connection interrupted.

The indicator drums are provided with pawls and turn freely on their shaft. When the shaft is turned back it takes the drums with it and returns them to their initial position. To prevent the drums from being turned too far by the momentum of a careless movement, the arrangement shown in Fig. 3 is made. The wheel which is placed in action when the mechanism is started, at one rate or another, turns also cam *a* and acts on lever *b*. The latter turns with sprindle *c* of semicircular cross-section which takes the position shown in the illustration the moment the drums are set in forward motion, and the drums are provided with pins *d* which take abutment against the flat side of *c*. Spring *e*, acting on lever *b*, effects the unlocking as soon as cam *a* permits it.—From *Bulletin Officiel*, June.

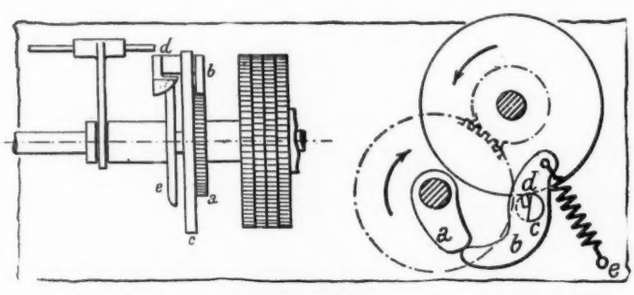
OIL Brake Instead of Motor Brake—The use of brakes for long and gradual descents has always been more or less inconvenient, because the relatively rough surface of the brake elements results in considerable wear and heating of parts and also because the brake must be held tightly in hand in order to obtain just the effect corresponding to the grade and surface of the road. Motor brakes, to be sure, by which the resistance to compression of the gases in the motor cylinders is enlisted for the purpose of holding the vehicle from acquiring too great a momentum, have been found suitable for touring cars in mountainous regions and very desirable for motor trucks in any locality where grades, even short ones, abound. But the use of motor brakes has been so tightly protected by patents that it is only rarely employed outside of the vehicles made by the patentees. This condition has now finally

spurred the Rochet-Schneider company of France to the invention of a hydraulic brake which bids fair to equal or surpass the motor brakes in suitability for long-sustained braking efforts and in which the working elements are so familiar, being generally employed in every hydraulic device, that the patent or patents scarcely could command excessive royalties. This brake consists in a gear pump which takes oil or grease from the change-gear box and sends it back to the same receptacle through a channel which is ordinarily wide open but is throttled more or less when a braking effort is desired, thereby causing a greater or lesser resistance to the turning of the gear shafts. As shown in Fig. 4, the gears used as a pump also serve to effect constant engagement between the primary and secondary gear shafts, but their great width and the close-fitting boxing in which they are mounted are features dictated by their function as a pump. The oil is drawn in through the channel C and expelled through channel D, the resistance in which is graduated by means of throttle E. There is always a certain amount of slippage in a gear pump of this type, owing to the impossibility of fitting the gears tightly in its boxing, and the braking is therefore not absolute but still permits the wheels to turn. The heat generated by forcing oil or grease through a strangulated channel will of course be transmitted to all the contents of the change-gear box and will be radiated and convected by the casing to the atmosphere. As in all other cases where a liquid is forced through a small opening, the resistance will be more pronounced the greater the speed, and there will therefore be a tendency, whenever this brake is applied too suddenly while the vehicle is moving rapidly, to cause a sharp retardation at first followed by a gradual release as the oil gets time to pass through the strangulated channel.—From *Omnia* and *Motor Trader*.

—

STRENGTH of Perforated Soft Steel—By a series of tests conducted at the laboratory of the Conservatory of Arts and Trades by C. Birault it has been demonstrated that the tensile strength and elastic limit of perforated soft sheet steel are considerably greater than would be inferred from consideration of the amount of steel removed, and that the relative increase of strength is particularly pronounced when the holes are drilled rather than punched. When the holes are punched to their full size, the results are irregular and uncertain. This is ascribed to the cracked condition of the metal found to exist at the edges of punched holes, due to the forcing and upsetting of the molecular structure by the action of the punch. If punched holes are reamed, removing the torn portions of the metal, the results are found to be the same as in case of drilled perforations. The higher strength is ascribed to the more favorable form given the metal by suitable perforation, the chances for yielding and temporary deformation under stresses being improved. In one of the series of tests the ultimate strength of bars with drilled holes averaged an increase of 12.3 per cent. and the elastic limit 9.2 per cent., while the punched bars showed an increase of elastic limit of 13.5 per cent. but, on the other hand, an 8 per cent. reduction of the ultimate strength. The drilled perforations were ovalized by the pull of the testing machine and parted on middle lines of the holes, while the punched holes remained round and showed irregular lines of fracture. As in the latter cases the elastic limit and the ultimate strength almost coincided this was an effect to be expected.

One of the conclusions drawn from the tests was that the reaming of punched rivet holes in automobile frames and similar construction material should never be omitted, some of the figures obtained by the tests showing that rupture may occur at the original elastic limit of the material. The details of the tests are presented in *Le Génie Civil*, July 19.



Taximeter details. Fig. 2—Interrupter. Fig. 3—Speed check

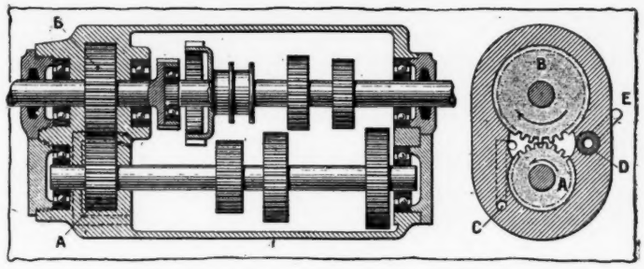


Fig. 4—Brake in form of gear pump

—

VALUES and Prices of High-Speed Steels—From about 400 searching and impartial tests of high-speed steels conducted at the Royal Prussian Institution for Testing of Materials at Gross-Lichterfelde, with a view to the settling of technical opinion in a field where the facts have become obscured through the intensity and variety of the competition, it has been shown that the great majority of high-speed steels do not differ materially in working capacity or intrinsic value but that there is a small class of steels, comprising mostly English and 1 Austrian variety, in which the efficiency is considerably higher and that finally there is a series of steels known as kobalt steels and manufactured both in England and in Germany which decidedly top the list with regard to working capacity, this term relating to the amount of work done with one sharpening. Among these kobalt steels there was no great difference, so far as the turning of chrome-nickel steel was concerned, but some of them, and one English steel especially, showed considerable superiority for turning cast iron. Many of the details are presented in an article by Professor Schlesinger in *Stahl und Eisen* for June 5.

A scale of economical values may be established by dividing the figure indicating the mechanical efficiency by that of the market price. When this is done, it is shown that neither is the cheapest steel the most economical nor the highest priced steel the best. The former costs 3.50 mark and the latter 13.50 mark per kilogram (about 40 cents and $1.53 per pound). And the kobalt steels, containing about 5 per cent. of kobalt, make the best economical showing of all, because they combine great durability—wearing qualities of the cutting edge—with a relatively low market price.—From *Werkstattstechnik*, July 15.

—

GERMAN Prizes for Adjustable Benzol Carbureters—The Prussian Ministry of War has just issued the rules and regulations of a competition of carbureters specially designed for benzol which is to be held in December next. The competition is international, although one of the conditions requires that in the case of a foreign carbureter carrying off a prize, arrangements must be made for its manufacture in Germany. Entries at the rate of $125 per carbureter will be received by the *Versuchs-Abtheilung des Militär-Verkehrswesen*, 2, Siegfriedstrasse, Schöneberg, Berlin, up to November 1 next, the money being sent at the same time to the *Kassenverwaltung* at the same address. The carbureters will be subjected to both road and bench tests, competitors being permitted to enter separate patterns for private and industrial vehicles. Four prizes are being offered in connection with the competition of respectively $2,500, $1,250, $750 and $500, the points to be taken into account in making the awards being simplicity and durability of construction, economical and noiseless working, facility of

engine starting from cold and in cold weather, and ease of adjustability for use with gasoline. The tests will be made with ordinary commercial benzol supplied in the winter months of a specific gravity of about 0.880. Particulars of the competition can be obtained from the address given.—*The Autocar.*

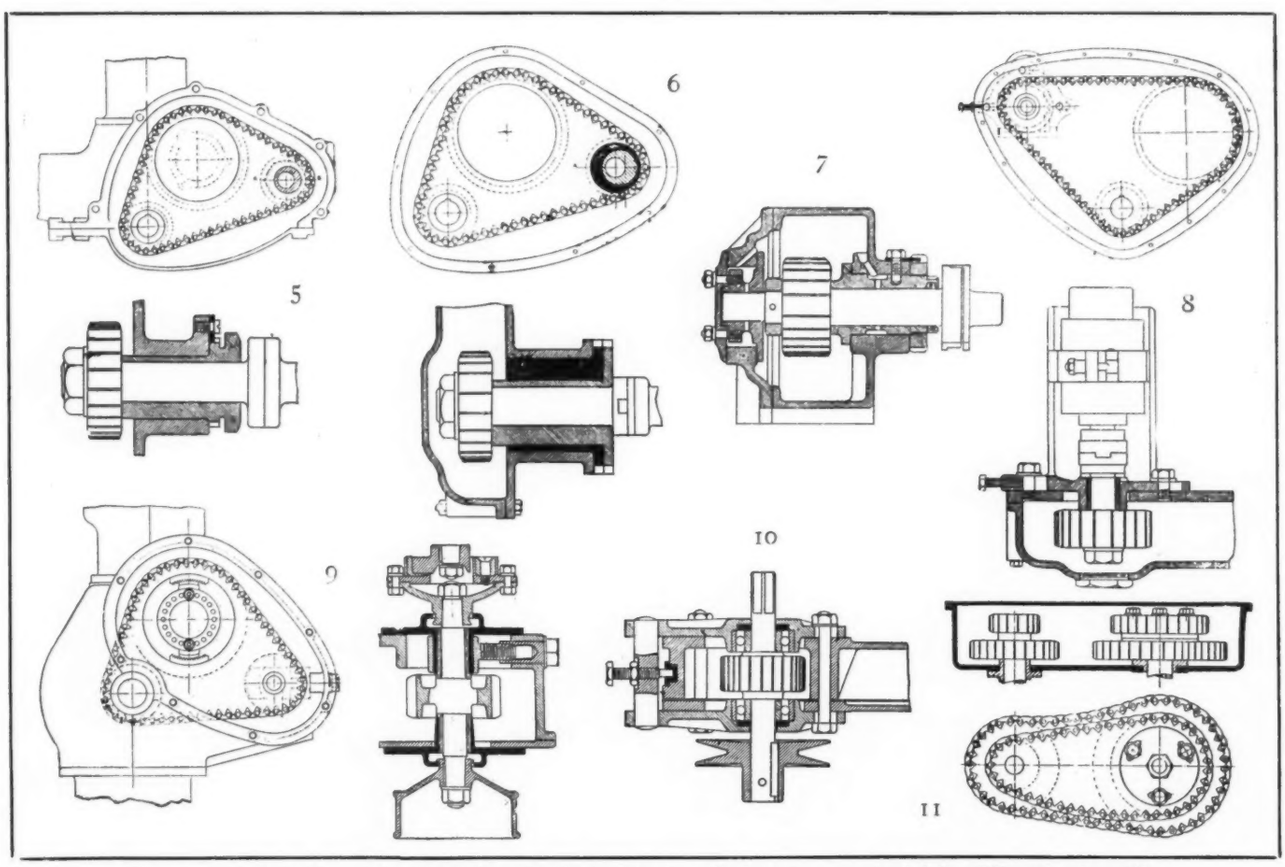
—

ADJUSTMENT of Silent Chains for Valve and Ignition Gears—The tendency to employ chains for driving the shafts for valve control and for the magneto as well as for the gearbox, which originated in England and is finding some favor in France and America, is accepted only with great reluctance in Germany where the technical opinion of experts leans strongly to the idea that all the advantages of silent chains can be attained by using miter or herringbone or even straight spur gears, if only close attention is paid to the correct shaping of the gear tooth curves in each case. As a matter of complying with the inscrutable dictates of automobile fashion, and with considerable misgiving as to the continuance of the fad, some activity is displayed, however, among German automobile manufacturers to get the benefit of the experience with the chains which has been gained in England. In this respect the precautions which must be taken to obviate the effects of that lengthening by wear to which all chains are subject, come in the first line. They also constitute the most important objection to the adoption of chains. First, a considerable initial stretch must be effected in each chain, unless this is done in advance and at some additional cost by the chain maker, by running it under load for a short time on a special machine established for that purpose, and subsequently the normal wear of the chain pins and bushings, after the chain has been placed in commission in a car, determines a further lengthening, much smaller in percentage than the initial stretch but yet so large that it cannot be neglected.

In a serial article, Mr. Praetorius describes in *Der Motorwagen* all the features of the practice which has been established for the use of silent chains in the motor of an automobile, drawing the information largely from the catalogs of British chain makers, and the last instalment is devoted to the different methods to which automobile manufacturers resort in order to take up the wear. These methods are represented in Figs. 5 to 11. Armstrong, Whitworth & Co. (Fig. 5) provide an eccentric sleeve adjustment for the magneto shaft giving a maximum of 6 millimeters of lateral displacement. Gregoire (Fig. 6) uses two eccentric sleeves, so that up or down movement of the pinion can be avoided, probably with a view to leaving the valve timing entirely unaffected. The Isotta Fraschini method is indicated in Fig. 7 and seems elaborate in the alignment of the wearing parts.

Chenard-Walcker (Fig. 8) pushes the whole sprocket pinion bearing as well as the baseplate of the magneto outwardly in a rectilinear movement by means of a drawbolt, locking the adjustment with setscrews. The arrangement provided by Grossley (Fig. 9) is also a rectilinear movement with ample guidance from sideplates and includes a provision, as shown in the sideview, for turning the crown of the camshaft sprocket a little with relation to the camshaft, so as to maintain the valve timing intact. A somewhat similar lateral shifting of the whole sprocket bearing, in this case including two ball-bearings and safeguarded by ample sliding-surfaces, is used by the Standard Motor Car Co. (Fig. 10).

For the Fetch and Carry manufacture Simpson and Renold have, according to Mr. Praetorius, provided a double drive from crankshaft to camshaft, as shown in Fig. 11. The two sprockets on the crankshaft and one of those on the camshaft are keyed to stay, but the second camshaft sprocket can be turned on its shaft and can be secured in its relation to the larger camshaft sprocket by three setscrews. The object is to place the slack of the two chains on opposite sides and thereby prevent the lengthening of the chains from affecting the relations of crankshaft and camshaft.—From *Der Motorwagen*, July 10.



Figs. 5, 6, 7, 8, 9, 10 and 11—Examples of adjustments for silent chains, as adopted for different automobiles

Quiet Colors in Fashion

Better Taste in Selecting Body Hues Distinguishes the Car Manufacturer and Buyer Than in the Past

Blues Popular But Hard To Apply—Browns Win Deserved Favor—Lakes Are Very Fine If Well Put On

THE past season's automobile shows and the vehicles on the road demonstrate beyond dispute that loud and flamboyant color patterns have been in very large part eliminated from the list of desirable colors for the automobile during the season of 1913, at least.

Colors that attract attention by virtue of their sensational characteristics rather than by a modest appeal to a public that puts real art above the industry of painting wooden Indians, have had, in the main, their brief and riotous day, and are now being converted into other uses.

It is a good omen for both the car owner and the car seller that this is so, for nothing robs a car of its grace of fashion so quickly as a color, or a combination of colors, which has only a circus wagon attractiveness.

The sum of the whole matter is, after all, that the automobile, in the plan of elegance, dignity, beauty of lines and artistic effect generally, depends largely upon the choice and selection of the colors employed; and ultimately that range of selection must go the way the same selective faculty has gone with the horse-drawn carriage, and end in practically the universal employment of colors quiet, unobtrusive, but withal full of life, and tone, and brilliancy.

Consider the Merits of the Color Before Ordering

But before making final choice of a color for the car it is in order for the owner and the painter to consider the merits of the color aside from its appearance.

Beauty is more largely a thing of service than of appearance in many cases, and while both beauty and hilarious effects are desirable in the color and finish of the car, the virtue of durability must of necessity be weighed in the balance. Survey for a moment some of the advantages and disadvantages which come from the use of various colors now foremost in public estimation: Practically all of the grays are neutral in their effect upon the surface; that is to say, they exert no increasing or diminishing effect upon the surface to which they are applied. They are neither cold nor hot in respect to their effect upon the senses, as seasons come and go. Indeed, they are virtually all the year round colors. They show dirt and surface blemishes less than most other colors and if applied skillfully they wear, under good maintaining practices, like Guinana Greenheart. All of the grays are comparatively easy to apply. Their wearing strength comes from the white lead in their composition. These gray pigments, moreover, in the matter of cost compare favorably with the cheapest of the other colors.

Reds, and notably the light reds, have the effect of increasing the actual size of the car to which they are applied. They have a warm effect in winter and a correspondingly hot effect in summer. While such flaming reds as English vermilion wear durably when given exceptionally good care, the rank and file of these fiery reds fade and lose their original brilliancy after a little time.

Greens and blacks have a diminishing effect upon the surface, but require perfection in surfacing methods as they show surface defects more freely than other colors. They are, nevertheless, durable colors if kept secure under a strong body of varnish. All of the dark, fine greens, of which there is a noble array, are colors of elegance and refinement.

The brown pigments, of which at the present time there are numerous very beautiful shades, are neutral colors in respect to the seasons. They are durable under conditions which would upset not a few other pigments; do not show surface defects readily, are easy to produce on the surface, have strong covering power, show dirt and road service to the minimum extent and stand up well under cleaning and renovating processes.

There are many splendid aristocratic lake pigments which Fashion has decreed to be popular for this and perhaps succeeding seasons, which are durable under good care, but which the car owner who elects to paint his car is quite certain to have trouble in handling. They are colors which require as perfect grounds as it is possible. They are absolutely negative in their effect upon the dimensions of the car, and for brilliancy of color, without being in the slightest degree sensational, are unsurpassed.

Although the blues are meeting with such general favor, they are not, for the most part, colors easy of application. The light blues are less befogged and discolored under varnish, gases and atmospheric impurities than the darker shades, but all are subject to effects which ordinarily do not disturb most of the other staple pigments. At the same time, the blues almost without exception are to be accounted durable colors and when kept well protected under varnish will wear on and on and have a show of the aristocracy to the end. Surfaces of dark blue appear perceptibly smaller than they really are, while the lighter shades of the color exert a neutral effect. These light blues do not show surface defects to the same extent that the dark shades of the color do.

The yellow family of pigments are not so much in evidence on the automobile as formerly, being hard colors to bring out to a finish. They show surface defects plainly, but if maintained in good shape during service will wear durably.

White lead, a pigment known through successive generations as a wonderfully enduring substance, forms the basis of yellow. Wherever you find a color compounded from the old-time Dutch process white lead you are certain to have confidence in the resultant pigment. For this reason grays and yellows and all the blended pigments between these two are entitled to the distinction of being raw-hide wearing mediums. They require plenty of time to dry, that is assured, and if denied this they create surface disorders not easily remedied.

Dark Colors Absorb Most Heat

The grays and yellows and their intermediate colors reflect the light and heat better than dark colors, and consequently if brought up right fade less. The dark colors invariably absorb more heat than light colors. They also appear to lower the height of the vehicle to which they are applied.

As a matter of information helpful to the car owner in choosing a color for his car it may be stated that the basis of the green pigments is potash, sulphur, chromic acid, copper, arsenic and verdigris, combined and varied in methods of manufacture to produce incomparably beautiful effects. Possibly, however, many of the popular greens of the present day contain only a limited per cent. of the above ingredients. White, yellow, Prussian blue, chrome green, golden ochre, burnt amber and black, all contribute more or less to the composition of the 1913 automobile greens. These are in large part very durable colors which accounts for the permanent qualities of the green pigments.

Going back into the realms of chemistry we find that the base of the blues—ultra-marine blue being the grandfather of the family—is silica, alumina, soda, sulphur and sulphur oxides. Methods of manufacture are too intricate for the lay mind to fully comprehend them, but of this the car owner may be assured, that the various shades of the color, derived from the above ingredients, and compounded in some instances with white lead, are permanent, and endowed with excellent color retaining and wearing properties.

The browns, and especially the natural browns from which many of the latter day browns are compounded, are earthy pigments, and like most of Mother Earth's children are strong and durable. That they are mixed and intermixed with other colors in order to produce the wide variety of brilliant browns so much in evidence upon the automobile tends in a measure to weaken their vitality goes without saying. Still, car owners need not doubt the wearing properties of the browns, for they are, despite the above fact, exceptionally permanent pigments.

The lakes of which there are many magnificent examples in widespread use upon automobiles to-day are in great part derived from coal-tar products. While perhaps not to be classed as strictly permanent when used apart from a strong supporting base, the car owner need not hesitate to choose any individual of this fine group of pigments in selecting a color of brilliancy for his car.

Invariably, all the lakes, including the belle of the regiment, No. 40 carmine, require very strong and perfect supporting grounds, and when thus provided for they wear like the homespun that our ancestors used to spin.

—

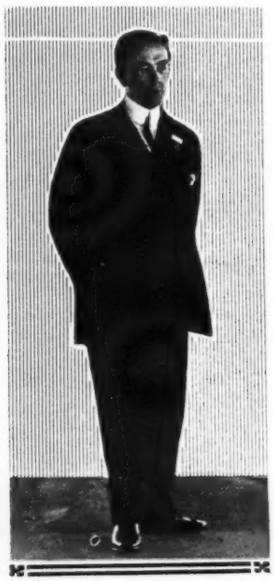
Repainting Polished Work

When work that has been brought up to the natural wood is sent to the shop to be painted in colors, the question very often comes up, and especially when the job is in pretty good condition, why is it necessary to remove all the undercoats before proceeding to paint it? The reason is simply this. The foundation, as given by the natural process, is a very faulty one, because it is based upon the shellac varnish, and is in no sense a fit one for colors mixed with oils.

Jackshaft vs. Double Rear Wheel Brakes

Designer Outlines Disadvantages of Jackshaft Brakes

Paper read before the Society of Automobile Engineers and the Institute of Automobile Engineers by Arthur M. Laycock



Arthur M. Laycock

Digest

¶ The Government requires that both brakes on army trucks be on the rear wheels and fitted separately. Similar exactions are insisted on by the London Scotland Yard authorities in regard to all public service vehicles. New York City taxicabs have abandoned drive-shaft brakes. These facts bring forcibly to mind the importance of brake location.

¶ The closer the point of application of the braking force is to the final reaction the fewer the parts subjected to strain.

¶ Enormous strains are applied to the ends of the jackshaft in trucks fitted with jackshaft brakes, when bringing to a standstill. With this type of brake the stresses taken by the sprockets through the driving chains are often more than twice the full torque of the motor.

¶ In a wheel-brake system it is necessary to provide a proper equalizer rock-shaft so as to eliminate the skidding tendencies that follow on unequal brake application.

¶ The pressure per square inch on the working surfaces of universals and differential gears is already very high without imposing greater reversed braking strains through the use of the driveshaft brake.

AN investigation from a designer's outlook on the following lines may prove instructive:

1. Danger of braking through any intermediary and not direct.
2. The detrimental effects of brakes on end of jackshaft.
3. Effect on universals and differential gears.

Our government in its specifications for army trucks has without any question taken the right step in insisting on both brakes being on the rear wheels. This must have a beneficial effect on the trade in general. Similar enactments should be made in all our large cities to save property and life in congested streets. The London Scotland Yard authorities who are represented by a capable and efficient board of engineers, now insist that all motor buses and public service vehicles have both brakes fitted to the rear wheels. Each of them must be mounted independently; in other words, if both brakes are internal there must be two separate drums to each wheel, and two separate sets of fixing bolts.

Traffic Imposes Severe Braking Strains

These exactions may seem to the average engineer to be most severe and quite uncalled for, but one may stand on the curb in London and see one of the buses with thirty-four passengers bear down on the traffic at over 20 miles per hour and have to stop at a moment's notice. Experience has shown that a London bus-driver does not make any allowance for a faulty worn-out chain. His judgment is remarkably good as to the varied conditions of the traffic, but circumstances that will not enable him to make a second grab at his hand lever continually confront him; and unless he shows extreme speed of action the inevitable has happened.

Imagine New York and Chicago motorized, the average speed changing from 3 to 12 miles per hour. Not only capable brakes but proper location as well will be insisted upon. The reaction due to the frictional force on the brake surface should be as close to the road wheel as possible. Obviously, the closer the point of application of the braking force, and the point of its final reaction, the fewer the parts subjected to strain, which means not only a minimum number of breakdowns, but the greatest possible safety to the operator as well as to the public at large.

It is equally objectionable to brake through the bevels, spur gearing, double reduction gears, and the worm drive as applied to heavy vehicles; in fact, in these constructions it is not only dangerous in the extreme, but absolutely wrong when one considers the enormous strain of a reversible nature coming from the rear wheels when the propeller-shaft brake is locked. Of course, most engineers will say that it is easy to make these parts heavy enough, but the writer cannot see the logic of adding this unnecessary weight, and, at the best, you have an uncertainty with every unit between the brake and the road wheel, which in some constructions is quite alarming, no matter what proportion, material or treatment these parts may have. In taxicab service, particularly in New York City, the propeller-shaft brake, which is so popular in Europe, has practically been discarded for both brakes on the rear wheels.

Whatever may be the status as to brake location on the pleasure car, there is no comparison between the energy stored up in a 6-ton machine and the heaviest of pleasure cars. In case of collision at a given speed the disastrous possibilities of brake failure are more pronounced in commercial than in pleasure car work.

Detrimental Effects of Jackshaft Brakes

Most designers, I believe, are influenced by the popular trend, forgetting their own figures in a desire to give not what is called for, but what is easier to obtain. Both brakes on the rear are more difficult to design efficiently. One has only to notice the diagram below to see the disastrous effects a jackshaft brake has on the bearings, shafts, etc. Engineers, who have really had the courage of their convictions and put in sections to correspond with the forces, have finished with tremendously heavy constructions, leaving the impression that they were inclined to be nervous about the jackshaft ends and careless with the real thing; in other words, dismantle from one of our best trucks a jackshaft with brake thereon and you will be struck very forci-

bly with the size of the outer ends as compared with the bevels, which are the real weak point in a good many designs, particularly where heavy engines are used and only a four-pitch bevel. Startling as the figures below may appear to be these facts remind one that perhaps they are nearer right than one would think if guided by the figures only.

Where semi-floating construction is used, which is preferable in the writer's opinion, on account of being able to use a much smaller sprocket and put the grief in the chain instead of in the delicate differential gears and driveshafts, the combined bending and torsion at the end of the jackshaft calls for a diameter that is very rarely taken care of properly. Many designers have the opinion that you can take a pleasure car axle and use it as a jackshaft. This is all right if jackshaft brakes are not used, the conditions then being analogous to pleasure car work so far as the jackshaft ends are concerned; in other words, you can never impose strains greater than the full torque of the motor. But with the jackshaft brake you may exceed this from two to three times; the larger the truck the more pronounced, of course, is the difference. Figures based on a 6-ton truck are so glaring in this respect that the outer ends must be so large as to be out of all proportion to the rest of the truck.

Example Shows Excessive Braking Strains

Take, for example, a 6-ton truck, 50 per cent. overload, 80 per cent. on the rear, which would be equal to about 10,000 pounds on each wheel; 40-inch rear-wheel diameter, sprocket diameters 6 inches and 22 inches, countershaft brake drum diameter 12 inches, and coefficient of friction between the road and the tires 75 per cent.

Considering the jackshaft brake first.

$$\text{The pull on chain} = \frac{10{,}000 \times .75 \times 20}{11} = 13{,}650 \text{ pounds.}$$

The horizontal component of 13,650 pounds = 13,300 pounds.

$$\text{Reaction on fulcrum pin A} = \frac{13{,}300 \text{ pounds} \times 3}{6} = 6{,}650 \text{ pounds.}$$

Plotting the above forces, Fig. 1, the resultant reaction on the sprocket bearing is 19,950 pounds.

The distance from the center line of the sprocket to the center line of the sprocket bearing being 3.5 inches, and the distance from the center line of the sprocket bearing to the center line of the countershaft 20 inches, Fig. 2, the total load on bearing is equal to

$$\frac{19{,}950 \times 3.5}{20} + 19{,}950 = 23{,}445 \text{ pounds.}$$

Considering a motor of 50 horsepower, 1,000 revoltions per minute, with a 12:1 reduction, that is, 4:1 in the bevels and 3:1 in the transmission, we obtain

$$\text{Pull in chain required in driving} = \frac{50 \times 63{,}000}{83 \times 2 \times 3} = 6{,}300 \text{ pounds.}$$

Strains Impossible with Wheel Brakes

You will notice that in the double rear-wheel brake construction it is utterly impossible to impose any load whatever on the jackshaft ends except, of course, the reaction from the radius rods, which can be taken easily direct on the frame. The figures given undoubtedly account for the many failures as well as for the exceptionally large brackets used by some. Almost 12 tons is quite an item to take care of. It seems perfectly absurd to introduce these strains on the end of the jackshaft and more than double the work on the chain. Where pleasure car axles, with brakes attached, have been used for jackshafts there has always been more or less trouble manifested. Especially is this the case with the bearings, tubes and drive-shafts which are, under these conditions, subjected to stresses they were never designed to withstand.

In the above paragraphs I have endeavored to demonstrate conditions the jackshaft brake imposes on the surrounding parts. This has not been considered by any means from every angle, but sufficiently, I think, to show the superiority of the double-brakes-on-the-rear over the jackshaft brake design. It is manifest that the wheels are the only place for the brakes, spelling finality in design as to their location, unless dependability and cost be sacrificed in the extreme.

Comparison of Skidding Tendencies

In making a diagnosis of the situation pertaining to propeller-shaft brakes, the same questions may be asked and like answers returned as in the case of jackshaft brakes. The question may be raised as to the propeller-shaft brake eliminating to some extent the tendency of skidding. This, of course, opens up a very debatable question upon which few engineers agree. I think there is not much to choose between braking through the propeller-shaft and both brakes on the rear provided with a differential brake rock shaft; whether we take the conventional differential and differentiate by resistance, or take one which equalizes to velocity, the car will most certainly have the same tendency to skid if the coefficient of friction for each wheel on the road varies. It is obvious that the durability of joints and gears must be sacrificed with the propeller-shaft brake, and I am sure that a good equalizer on the brake rock shaft with double brakes on the rear wheels leaves nothing to be desired so far as side skidding is concerned. Some of our largest makers having always retained this construction. The excessive wear and ultimate failure of universals subjected to the reversible strains are easily accounted for. The unit pressure per square inch in most of the joints is exceedingly high. In fact, it is quite ordinary practice to work at 3,000 pounds per square inch. This figure is almost the limit and necessitates forced lubrication in some constructions. Nothing but hardened steel on bronze or hardened steel on hardened steel will stand this. Happily these loads are only momentarily applied. I have recently found that one of our leading and successful parts manufacturers recommend power transmission on their joints equivalent to 4,400 pounds pressure per square inch with a reduction of 3:1 in the transmission. Imagine the results when you increase the pressure 200 per cent., which again is putting things rather mildly as compared to what actually occurs with our

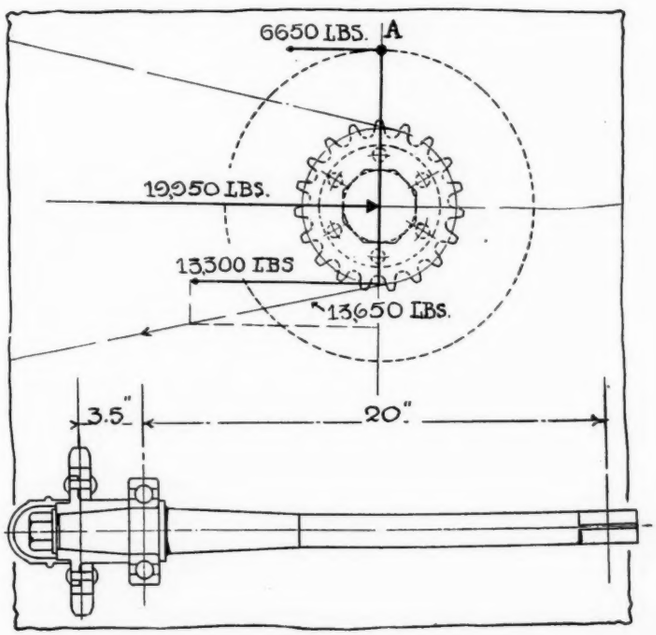


Fig. 1—Diagram showing the various forces acting on the chain sprocket of a 6-ton truck. Fig. 2—Detail of shaft showing overhang of sprocket from bearing and distance to center of countershaft

heavy vehicles such as limousines and worm-driven trucks.

The replacement of joints, however, is not so expensive or troublesome as the repair of broken differential gears. Precisely the same theory holds good here; most of our differential gears are working under exceedingly high pressures. In fact, it is quite common practice to work at from 75,000 to 100,000 pounds, the stresses being the resultant of the full torque of the engine and the reduction in transmission. The steel used here will probably range from 100,000 to 150,000 pounds per square inch elastic limit. Very few makers have a greater factor of safety than 2:1. These parts are also subjected to the same 200 per cent. overload from the rear, which you will admit must be a pretty warm place for gears already stressed to 100,000 pounds per square inch from engine torque alone. Considering that these extreme loads are of a reversible nature, it is very surprising the gears stand up at all, speaking well for the grade of steel used in their manufacture as well as the particularly fine heat treatments which are general practice in nearly all our large factories.

Bending Torsion Inadequately Considered

The drive-shafts are usually stressed very high, even in the full-floating type. In the semi-floating construction the combined bending torsion is very rarely taken care of adequately, figuring from the road-wheel end, whereas it may be quite safe as to taking the torque of the motor only. Take, for example, a 5-ton worm-driven truck, of approximate weight with body of 8,000 pounds; figuring 25 per cent. overload and 80 per cent. on the rear, which in round figures comes out 8,000 pounds per wheel; using an engine of 4.875 inches by 6 inch, four cylinders, which will develop 47 horsepower at 1,000 revolutions per minute; reduction in first gear 3.77:1, and a ratio of 8:1 in the axle; the diameter of the propeller shaft 1.5 inches; diameter of pitch circle on worm 3 inches, and diameter of rear wheels 40 inches.

The torsion moment in propeller shaft from the engine on low gear would equal

$$M\,t = \frac{47 \times 63{,}000}{265} = 11{,}300 \text{ inch-pounds.}$$

The torsion moment in propeller shaft from road wheels equals

$$M\,t = \frac{16{,}000 \times 20 \times .75}{8} = 30{,}000 \text{ inch-pounds.}$$

$$\text{Stress in propeller shaft from engine} = \frac{11{,}300 \times 5}{1.5^3} = 16{,}700 \text{ pounds per square inch.}$$

$$\text{Stress in propeller shaft from road wheels and propeller-shaft brake locked.} = \frac{30{,}000 \times 5}{1.5^3} = 44{,}000 \text{ pounds per square inch.}$$

$$\text{Tangential pressure on teeth} = \frac{11{,}300}{1.5} = 7{,}420 \text{ pounds on low gear.}$$

$$\text{Tangential pressure on teeth} = \frac{30{,}000}{1.5} = 20{,}000 \text{ pounds from locked wheels.}$$

Of course, the question might be brought up that under this load of 20,000 pounds there is no motion, the wheels being locked, but in mountainous country, I think you will agree with me, it is quite customary for a man to slide his wheels intermittently, and I am sure we can have considerable speed between the surfaces in contact and pressure very close to this. Many follow this construction in England at the present time, and it would be interesting to have our English friends' views on the subject. Where this design is used it undoubtedly speaks volumes for the dependability of worm gears as applied to heavy vehicles, considering that they may be subjected to pressures from three to four times more than in the case of the double-brakes-on-the-rear-wheels construction. The high stress in the propeller shaft is quite easy to take care of, but it is mighty hard on joints, differential gears and bearings.

In making road tests of a new chassis, the brakes are one of the principal factors, and abused in an extraordinary manner with the roughest possible treatment. One can very easily imagine the anxiety of a designer of a propeller-shaft brake in comparison with one of both brakes on the rear. The former has the propeller shaft, bevel pinion, ring gear, differential housing, differential gears with their bearings and drive-shafts in mind, while the latter is absolutely free from these considerations. In almost every item throughout the design of a chassis the engineer has in mind that the only way to obtain results is to cut down to a minimum the number of parts subjected to strain, or, in other words, to take the shortest distance between two given points.

The above discussion may be radical, but will seem quite in order to anyone who has handled an overloaded car in mountainous country, where an amateur will de-clutch and roll backwards for a considerable distance and then apply the brakes violently. An observer watching the manipulation of a robust jackshaft or propeller-shaft brake, coupled with a fierce clutch on a 25 per cent. grade, and the weight thrown on the rear wheel—as much as 80 per cent.—is led to surmise that the only logical design to stand abnormal shocks is the one involving the minimum number of parts subjected to the strains. To see a 6-ton machine under these conditions is an event not easily forgotten by any designer; words are inadequate to express the frightful abuse machines have to stand under the conditions enumerated.

The writer is absolutely unable to account for the propeller-shaft or jackshaft brake. There appears to be very much against them and very little in their favor.

Discussion on the Paper

The following discussion followed the reading of Mr. Laycock's paper:

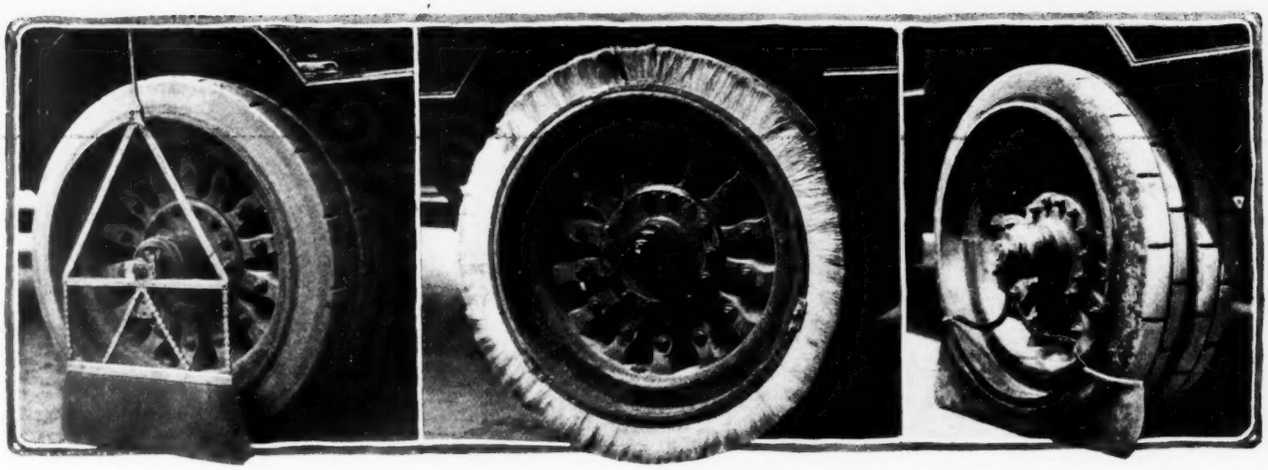
Thomas Clarkson, I. A. E., was asked to open the discussion, which was necessarily short due to lack of time. Mr. Clarkson agreed in the main with the paper. C. T. Myers agreed with Mr. Laycock and stated that the greater number of jackshaft troubles are traceable to the subjecting of them to strains for which they were never designed. If he had his way, he said, brakes would never be put on jackshafts. In addition to imposing undue strains, the braking through the jackshaft makes it necessary to put drums where bad disassembling jobs are unavoidable.

Mr. Clarkson asked that if in the advocacy of the placing of the brakes at the rear wheels the scheme was to have two drums on each wheel or one. Mr. Myers favored one drum for both brakes.

C. H. Taylor, Studebaker Corp., stated that the jackshaft brakes reverse the stresses to which the jackshaft is subjected much more often than they should be reversed. When these brakes are thrown on, a nasty jerking results which often breaks the chains due more to their catching in worn teeth than if the sprockets were perfect.

Mr. Myers spoke of the value of the accelerometer for tests of breaking strains. From his experiments with this instrument he has found that there are from two and one-half to three times as much stress produced in the operation of stopping a vehicle than is experienced in starting.

Mr. Taylor was skeptical of the value of the instrument, saying that unless the accelerometer were of extraordinary delicacy it would not give accurate results of stresses. He spoke of a method which he has used to arrive at the relative stresses resulting from starting and stopping, which consists of putting an indicator on the spring shackle arm and observing the deflection of this indicator on stopping and starting. In this way he has found that the strains are greater in the driving direction than in the reverse direction.



Splashguards under practical test in Paris. 1—Le Monteyea & Bellot. 2—Denis brush type. 3—Changé

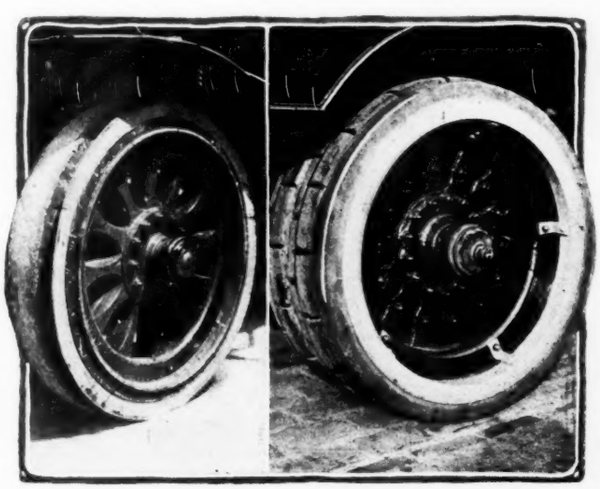
Paris Bus Company Tests Splashguards

City Authorities Seek Efficient Anti-Splash Device

THE motor bus as a means of passenger transport about cities possesses many advantages over the surface car running on a fixed track, but there are also one or two objectionable features associated with the newer form of public vehicle, as the people of Paris, London and other European cities making extensive use of the motor bus well know. The most serious is its mud splashing proclivities. The wide rubber shod wheels general with such a vehicle and the fact that they are continually running, stopping and starting right next the curb for the convenience of passengers, just in the ideal point of the road for plowing through whatever moisture collects, render the solution of this problem of preventing the splash a crying need. Paris in particular has shown an active desire to discover a solution. Some notes on tests at present being conducted there are given below.

PARIS, July 21—On the order of the city authorities the Paris General Omnibus Company is trying out splashguards with a view to their adoption on all of the 1,000 buses in use in the city. The announcement of a splashguard competition brought forth an entry of 300 appliances, all of which were examined by the bus company's engineers and forty-seven selected for practical tests. These tests consisted of fitting a set of the guards to the wheels of a bus and running the vehicle over a prepared mud track lined with white canvas-covered boards divided into squares. As soon as each bus had passed by a photograph was taken of the boards for future consultation and comparison. Out of these forty-seven guards seven different makes were selected for practical tests at the company's expense on buses in daily service in the city. In addition, the company expressed its willingness to test a number of others if the makers would provide appliances for that purposes.

These tests are being carried out on the Porte St. Martin to Grenelle line and will last until the end of the month. Their capability as preventives of splashing are already known; the test will thus be one of the ability of the guards to withstand the daily racket of city streets and constant contact with curb-stones. If these trials prove that a really practical and cheaply constructed splashguard has been devised, there is every possibility that the city authorities will make its use compulsory on all public service vehicles. It is not proposed to make splashguards compulsory on private cars.



Two types of continuous rubber rim splashguards designed to wear down with the tire, thereby always maintaining contact with the road surface. The view on the left shows the Champerrot design; that on the right, the Menu

There is a general similarity in the splashguards submitted for test. They are either a rectangular piece of leather of canvas hanging from the hub cap and having some device to prevent it swinging round with the wheel, or a deep circular ring of rubber or canvas or a combination of both, of the same diameter as the wheel and attached to it. In this class is the Menu, illustrated herewith, which practically consists of the walls of an old pneumatic tire—the entire tread having been cut away—fastened to a light rim, and this rim secured in a suitable way to the rim of the omnibus wheel. An alternative system is to have bristles in place of rubber and canvas, thus forming a circular brush. These bristles wear down as the rubber tire is decreased, and they suffer no damage when brought in contact with the edge of the sidewalk. All the difficulty with hanging splashguards has been to prevent them swinging round with the wheel with every sudden change that takes place in the speed of the vehicle.

Hudson To Make Sixes Exclusively

Wheelbase Longer—Four-Speed Gearbox—Underslung Rear Springs

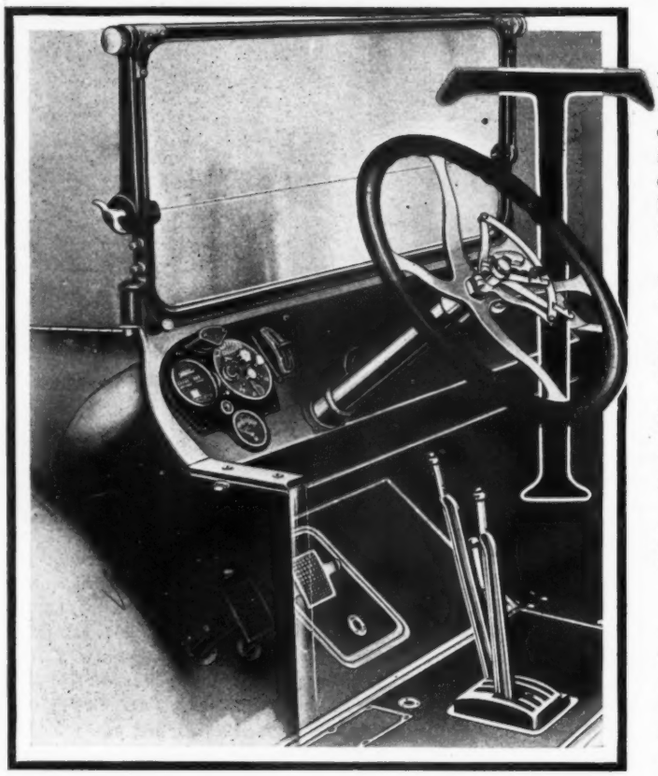


Fig. 1—Hudson—showing gasoline tank contained in dash; also steering column on left side with levers in center of floor board. The shortest lever is for the starter. On the dash are neatly grouped the speedometer, oil gauge, lighting buttons, etc.

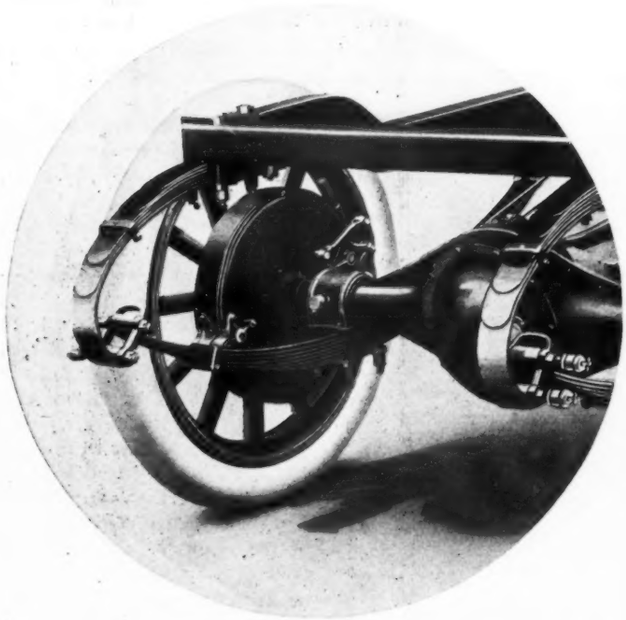


Fig. 2—Hudson uses underslung three-quarter elliptic rear springs for the first time. Underslinging the springs gives a greater radius of spring action

THE automobile public will receive with considerable surprise the announcement that the Hudson Motor Car Co. will make six-cylinder models exclusively for the 1914 season. The four-cylinder model 37 which was brought out last year is to be discontinued; the entire efforts of the big plant will from now on be concentrated upon model 54, also appearing for the first time for 1913.

But the new model 54 is altered in appearance as well as in many of its details from its predecessor. The principle changes in the new Hudson are enumerated:

1914	1913
Wheelbase 135 inches.	Wheelbase 127 inches.
Left drive and center control.	Right drive and control.
Gasoline tank under cowl — gravity fuel feed.	Gasoline tank at rear under frame —pressure fuel feed.
Four-speed gearset—direct on third.	Three-speed gearset.
Cranking lever at center with control levers.	Cranking pedal in floor.
Delco distributor in unit with motor-generator.	Distributor separate from motor-generator.
No side lights—dimming device for dimming headlights for city driving.	Side lights used in addition to headlights.
Stream line body.	Semi-stream line body.
Sloping hood.	Straight hood.
Speedometer driving gears housed within left front wheel spindle.	Speedometer driving gears exposed.

The frame side members are straight from end to end except for the upsweep in advance of the rear axle, the dash offset, or narrowing of 1913, being discontinued. To partly reach the same result as the offset at the dash, namely, bringing the side members closer together alongside the motor so as to give a good motor support has been accomplished by having them gradually converge from the rear to the radiator, a design which permits of more ready fitting of power plant attachments than possible with the dash offset. With this converging design it is possible to have the side members well separated at the rear, so wide as to mount the springs directly beneath the frame side pieces, instead of outside of them.

With these changes before us, we will next consider the new model 54 in detail, beginning with the power plant. The L-head type is retained with its bore of 4 1-8 inches and stroke of 5 1-4 inches. With this long stroke, the developed power is 55 at a speed of 1,500 revolutions per minute.

Lighter Reciprocating Parts Used

The cylinders are cast in blocks of three and throughout the engine is somewhat changed in size of parts so as to make a lighter construction and at the same time to retain its strength. This has been done particularly to the reciprocating parts so as to reduce vibration to the minimum. Very accurate balance of all moving parts to within a fraction of an ounce has been striven for as another blow against vibration and to increase silent running.

The various motor improvements have resulted in a considerable increase in the mileage per gallon of gasoline. The connecting-rods have been considerably lightened and the weight of the pistons also reduced. Further fuel economy is gained by the carbureter setting, which is such that it gives the best results for road speed rather than extreme acceleration. There is a growing feeling among the industry that a rational acceleration is desirable to that quick get-away of the racing car which is so hard on tires as well as the car mechanism in general. Reducing the weight of the flywheel has aided in a quicker and smoother motor acceleration.

Due to the bolting of the gearcase to the rear of the arms of the yoke which passes around the flywheel, a unit power plant construction results. The yoke construction with exposed fly-

GRIPPER AND SIDE GUIDE

wheel is characteristic of Hudson design. The motor is suspended at four points by means of arms cast integral with the crankcase.

The Hudson company has always been an exponent of rigid four-point motor support, which is adhered to for 1914.

Valves are interchangeable and those for each pair of three cylinders are enclosed by cover plates. The push rod bearings are of new design and are made easily removable. Both the crankshaft and the camshaft are carried on three main bearings each. Helical timing gears occupy the usual position within a housing at the forward end of the motor. They are lubricated by a continuous stream of oil.

Ample Engine Bearing Surface Used

The latest engineering dictates are adhered to throughout the motor construction. The main bearings are located in the upper half of the crankcase, the cams are integral with the camshaft. The wrist pins are press fits within their pistons and are held in place by set screws secured by cotter pins.

The various motor dimensions follow:

Crankshaft:
Front main bearing—2 inches diameter; 2 13/16 inches length.
Center main bearing—2 7/32 inches diameter; 3½ inches length.
Rear main bearing—2¼ inches diameter; 3 13/16 inches length.
Camshaft:
Front—2¼inches diameter; 2 5/16 inches length.
Center—2¼ inches diameter; 1⅝ inches length.
Rear—1⅞ inches diameter; 1⅜ inches length.
Connecting-rod bearings—2¼ inches diameter, 2¼ inches length.
Valve diameter—2 inches; clear opening 1¾ inches.

By making the crankshaft .25 inch larger in diameter, its new measurement being 2 1-4 inch, greater rigidity is obtained and the use of the curved cheek on the shaft aids in giving it a better rotary balance, in that the center of gravity of the cheek is within the axle plane.

The cooling system of the motor is a positive circulating type with a centrifugal pump, honeycomb radiator and six-bladed, belt-driven fan. The water pump is mounted on two bearings on the right side of the motor. This gives it a positive alignment with the pump shaft. The fan bracket is attached to the motor, and a spring is provided for keeping the belt at a constant tension.

The motor is lubricated by a constant level splash system with a reservoir beneath the crankcase. A new type of pressure distributing plunger pump operated by the camshaft furnishes oil to the crankshaft main bearings and timing gears through leads. The oil is strained before it is recirculated, while all oil pipes are concealed within the crankcase.

The pump shaft on the right, in addition to operating the cen-

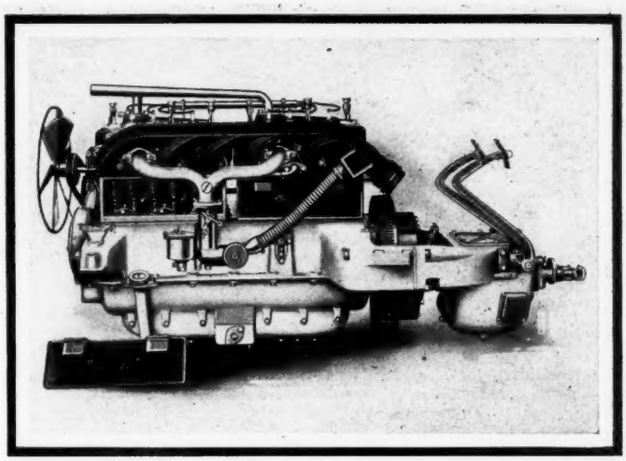


Fig. 3—Unit power plant of Hudson Six which is supported direct to the frame side members by a rigid four-point system

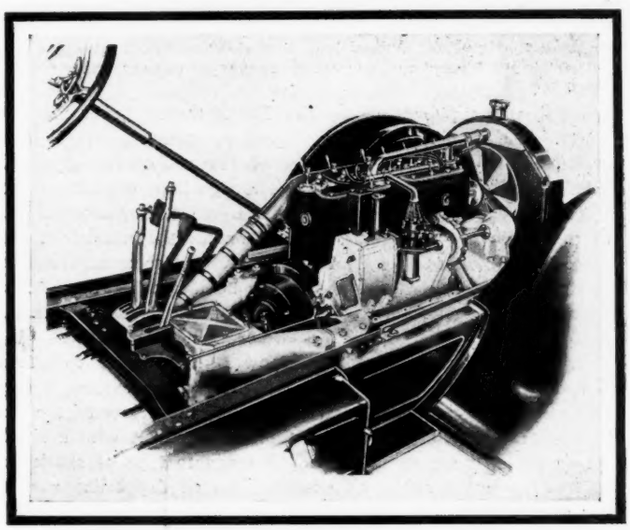


Fig. 4—Showing starter lever for Delco system, this lever being to the right of the emergency brake one. The Hudson engineers mount all of the unit ignition-lighting-starting apparatus on the right rear of the motor

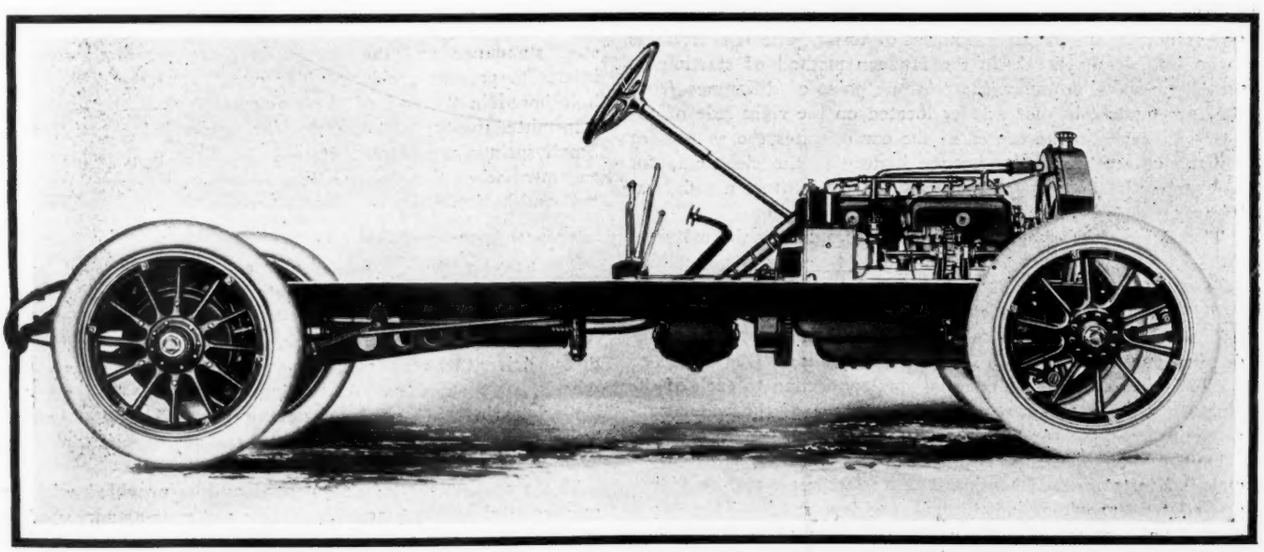


Fig. 5—The wheelbase of the Hudson Six is 8 inches longer than this year, the added space giving the necessary increase in body arrangements for added passenger accommodation

GRIPPER AND SIDE GUIDE

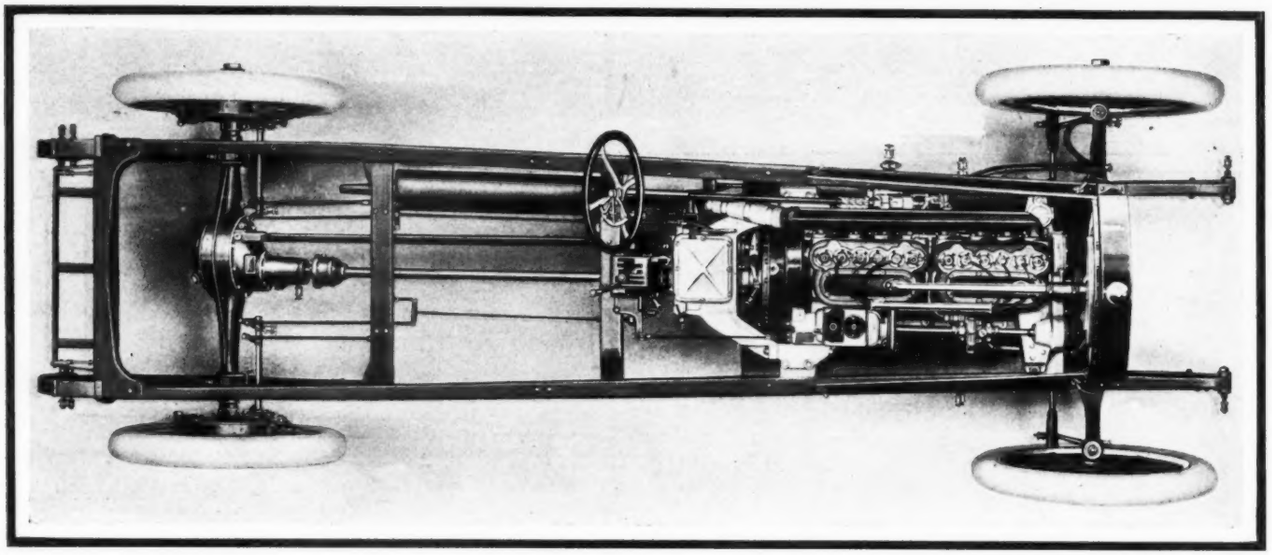


Fig. 6—The Hudson frame has the side members straight from end to end excepting for the upsweep in advance of the rear axle. The side members gradually converge towards the front where they are close enough together to take the motor support

trifugal water pump, drives the Delco motor generator and timer. The combination Delco ignition, cranking and lighting system which was made a feature of Hudson cars this year is continued with some changes. The ignition distributor for timing the sparking in the cylinders is now made an integral part of the motor-generator unit, whereas on the 1913 models it was placed at the forward end of the engine and separate from the electrical unit which must necessarily be located at the rear so that its driving gearing may be made to mesh with the teeth cut in the periphery of the flywheel for cranking the engine.

In its adaptation to the Hudson power plant, the Delco system is specially built as an integral part. The entire system is controlled by a special switch within reach of the driver of the car. The system provides a dual ignition arrangement with a single set of plugs, the generator giving a magneto type of spark for ordinary running, while an auxiliary set of dry cells provides for emergencies.

Lever Works Delco Starter Mechanism

For cranking the engine, the generator is temporarily converted into an electric motor and turns the crankshaft through the intermediary of the flywheel and gearing which is thrown in by the operator. However, the electrical cranking method is understood by the average motorist of to-day, and it is needless to go into details here. In the Hudson method of starting on these new sixes, however, there is one point of difference from the 1913 models, in that a lever located on the right side of the gearshaft lever in the center of the car operates the switch for sending current from the storage battery to the electric motor and throws in the gears to the flywheel. Heretofore a pedal has been provided for the performing of these functions.

The Delco starting system is capable of spinning the motor at from 80 to 100 revolutions per minute. The control is simplified to the extreme in that it is only necessary after turning the switch to pull the starter lever to the rear.

The exhaust manifold located above the intake provides an individual passage from each cylinder which allows free escape of the burned gases. The intake has one connection to each of the blocks of three cylinders, which is also true of the water connections.

On the valve side the Zenith carbureter is also located. This make of instrument is continued from last year, and is of improved type providing adjustment for low speed. There is a control valve attached to the carbureter to regulate the hot and cold air, and also a strangler. This valve is operated by a lever on the cowl.

Continuing back of the motor, we note that the plate clutch

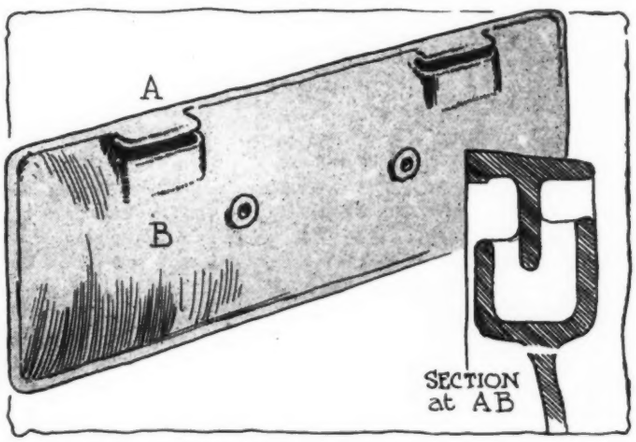


Fig. 7—Instead of breather pipes on the crankcase two oil traps are incorporated in each valve cover plate, the section through A-B explaining their construction

is continued. It is self-contained in an oil-tight case which is a part of the flywheel. The disks are 11 inches in diameter, are steel stampings and the driven ones are provided with cork inserts to prevent grabbing. The clutch spring is located in a hole bored in the end of the crankshaft, while the pressure is transmitted to the clutch drum through a ball-thrust bearing. Small springs are placed between the disks to facilitate disengagement when the clutch is thrown out. The whole runs in a half-and-half mixture of oil and kerosene.

Introduces Four-Speed Gearset

The new Hudson is provided with a four-speed gearset, whereas a three-speed type was formerly used. This new gearset is similar in construction to its predecessor, the direct drive being on third speed, while fourth is geared up considerably. On direct drive the gear ratio between the crankshaft and rear wheels is 3.66 to 1, and on the indirect fourth speed 2.99 to 1. Roller bearings are used throughout these gears, the bearings being mounted in malleable iron cages against working loose and in order to provide for expeditious removal.

The propeller shaft is uninclosed and is provided with two universal joints. A triangular torsion rod runs alongside of this shaft back to the axle housing. At its forward end this rod is carried in a spring buffer.

The rear axle is of the floating type, the load being carried on the housings and not by the shafts. Timken roller bearings are

conspicuous throughout the rear system, which in every respect is in accord with modern design. The differential and pinion are mounted in a separate carrier and can be removed separately from the rest of the axle; suitable adjustment features are provided. A new feature in conjunction with Hudson rear axles is that of mounting the three-quarter elliptic springs beneath the axle, Fig. 2, a construction which gives a wider open spring, which gives a greater range of spring movement without the frame striking upon the axle; axle driving shafts have integral flanges which bolt to the rear wheels.

Uses Internal Speedometer Drive

A special feature of the front axle construction is the placing of the speedometer gears within the left wheel spindle in an integral housing. The gears are of helical cut and run in grease. This construction eliminates the noise of these gears and at the same time protects them against road dirt. The accuracy of the speed indicating instrument should be augmented by this arrangement. The front axle has a slightly rearward tilt, throwing the spindle pin backwards, and to further increase the steering qualities of the car and reduce tire wear to a minimum, the spindle pin inclines inwards at the top so that if continued to the ground it would intersect the tire at the point of road contact, the value of such a design being that in turning to right or left the tire turns on a single point, which gives the minimum of wear.

The frame, which narrows as it runs to the forward end, is well braced by cross members, there being two intermediate, in addition to the end piece and the motor supports. Three-quarter elliptic rear springs are provided. These have a length of 54 inches and are 2.5 inches wide. The front springs measure 39 by 2.25 inches. The lower part of the rear springs and the front are nearly flat, making for easy riding. All spring eyes are fitted with phosphor bronze bushings, while the usual grease cup equipment for sending lubricant to these bushings is to be found.

On this new car the gasoline tank has been shifted from the rear of the chassis under the frame to a position under the cowl in front. Dut to this change, the fuel is now fed to the carbureter by gravity, whereas a pressure feed system was formerly necessitated. This location utilizes heretofore wasted space and at the same time insures positive feed to the carbureter as long as there is any fuel in the tank. The tank carries 21 gallons and there are two partitions to prevent the liquid from splashing sideways.

The new Hudson also appears with the steering changed to the left side, while control levers are now located in the center. Right drive and control were used on the 1913 six. The steering column passes through the cowl board, which is another feature new to Hudson construction.

Considerable change is evident in the body designs. The stream line, flush sided effect is very pronounced. The cowl is considerably rounded and slopes to the hood, which in turn slopes downward to the radiator. Fenders are crowned somewhat and follow the lines of the wheels more than ever. Running boards are practically clear in keeping with the smooth appearance of the whole. The rear of the body is rounded and curves inward at the bottom. Provision far the carrying of the tires is made at the forward end of the left running board.

The chassis has been generally improved by the addition of larger grease cups and fitting more of them. This is one of the important improvements noticeable on many of the 1914 chassis, and it is one which will meet with approval by every car owner. The periodic turning down of grease cups seems a small matter, but it is most conducive to improved running of the car. Considerable weight has been eliminated by discontinuing the sod pan, its place being taken by fish plates, which fill the gap between the crankcase and the frame members, and further, by a small apron beneath the flywheel. Leaving off the sod pan beneath the crankcase permits of the cool air striking the base of the case and aiding in keeping the oil cool.

Very Accessible Battery Location

A feature which does its part in giving a clean cut side appearance is that of locating the battery, together with the voltage regulator and cut-out of the Delco system, and also the dry cells for ignition starting between the running board and the frame on the right side beneath the front door. In this position they are most acceptable, and due to the cover for them being continuous with the apron between the frame and the running board their presence ordinarily passes unnoticed. In this position they have the further advantage of balancing the weight of the spare rims with tires which are carried in advance of the front door on the left side.

The equipment includes a motor-driven electric horn, Jiffy curtains and pantasote top, license carriers, folding trunk rack attached at the rear, integral windshield, speedometer sunk in the dash apron, demountable rims with one extra rim, permanently attached extra folding seats in the tonneau for converting the car from a five to a seven-passenger type, and other devices already touched upon.

Side lights are eliminated entirely, the 12-inch headlights, tail light and dash lamp being all that are used since a special dimming attachment is provided for regulating the power of the headlights. For city driving these may be made dim so as not to blind other traffic. All lights are regulated by a single switch handle, different positions of this determining the combinations of lights.

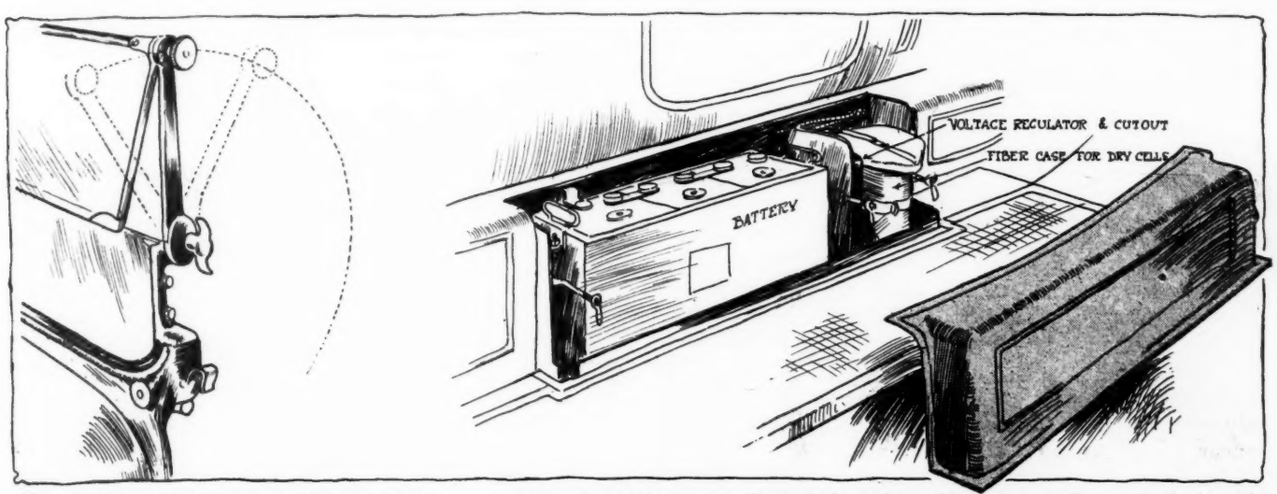


Fig. 8—The new Hudson windshield admits of a variety of positions, one illustrated showing the upper half swung backwards, forming a ventilator for the front seat passenger. Beneath the right front door and between the running board and the frame on the Hudson Six are carried the battery, dry cells and the voltage regulator and cutout of the Delco system

The Automobile

PUBLISHED WEEKLY

Vol. XXIX Thursday, August 7, 1913 No. 6

THE CLASS JOURNAL COMPANY
H. M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
231-241 West 39th Street, New York City

BRANCH OFFICES
Chicago—910 South Michigan Avenue Detroit—505 Free Press Building
Boston—1035 Old South Building Cleveland—516-517 Swetland Building
Buffalo—808 Iroquois Building

EDITORIAL
David Beecroft, Directing Editor
Donald McLeod Lay J. Edward Schipper
Sydney Oxberry Hans W. Weysz
L. V. Spencer, Special Representative, Detroit

ADVERTISING
F. B. Barnett, Cleveland C. H. Gurnett, Chicago
W. L. Chapman, Boston F. J. Robinson, Chicago
L. G. Vogel, Detroit

Cable Address---------- Autoland, New York
Long Distance Telephone---------- 2046 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico ---------- One Year $3.00
Other Countries in Postal Union, including Canada ---------- One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

The Kilowatt Car

IF the word horsepower were to be omitted from all automobile catalogs for 1914 we would only be seconding a movement indorsed, though not yet enacted, by leading engineering societies abroad, and we would be rid of a term which cannot forever cling to the automobile, being as misleading as it is inappropriate.

It is proposed that kilowatt should take its place. One kilowatt very nearly equals 1.34 horsepower; so the 40-horsepower car would become the 30-kilowatt car. The reduction of figures and the change of name would both be acceptable.

In the matter of sound, kilowatt is far superior. It has no ugly hiatus in the middle, but runs trippingly from the tongue. It has a plural, too, while the plural of horsepower has always been doubtful and awkward. Its abbreviation—kw, without a point—has been thoroughly established by the electrical engineering fraternity of the world. The value of kilowatt, as well as its spelling, is international and uniform, which could do no harm in the ever-growing export trade, while there is a small difference between the horsepower and the *cheval-vapeur* in France or *Pferdestärke* in Germany. The kilowatt equals exactly 1.36 of either of these units, which are only metrical units in disguise and now slated to disappear, if the engineers can have their way.

The Society of German Electrotechnicians has decided, in full accord with the Society of German Engineers, the International Electrical Commission and all other associations whose voice counts in matters of this nature, that from and after January 1, 1914, the power output of an engine, whether it is electrical or of any other type, shall be designated in kilowatts and that the horsepower (*Pferdestärke*) unit shall not be used or placed before the public any more, after that date.

Now that this example has been set, it may be worth considering whether the American automobile industry should not feel itself peculiarly called upon to jump into the lead in the matter by placing the proposed innovation before a very broad, untechnical but highly influential public first of all, thereby greatly assisting the introduction of the change in the industries where any change in terms and their values, be it ever so slight, means considerable bother with the remaking of tables and calculations. For American cars, with their motor starters and lighting equipments whose capacity must even now be designated in kilowatts if they shall be discussed at all conveniently, it would be an outright comfort to have the power of the main motor judged by the same unit.

The dear old horsepower, meaning little for designating power, anyway, unless the actual motor speed is mentioned in the same breath, probably never would be missed. Electricians have shown how easily it can be spared. To the public that wishes to compare one motor or one car with another, it is the figure and not the unit which counts, while the engineer is well aware that, so far as the car as a whole is concerned, neither horsepower nor kilowatt can give a menetal conception of its traveling capacity, so long as the weight, the mechanical efficiency of the gears, the spring suspension, the bearings, the tires and several other factors remain undetermined.

British engineers have devised the coefficient "K" and the coefficient "Sigma" in order to have a unit for judging car capacity, logically assuming that the intelligent car owner should be much more interested in such a unit than in horsepower, but the proposition to replace horsepower by kilowatt, while not aiming so high, has the advantage of simplicity in its favor and may do a great deal, through the revisions of formulae and tables and curves which it will necessitate, to weed out antiquated views and set ideas to work in new channels.

The committee on standardization of the S. A. E. is, within the ranks of this society, usually considered as having a thankless and irksome task. Might it not now, with this opportunity for establishing the same unit for measuring power in the electrical and the mechanical fields—which fields are singularly well and intimately blended in the automobile—call a special session for the purpose of presenting succinctly and attractively to the automobile industry the advantages to be gained by dropping horsepower for good and ever from automobile nomenclature and catalogs and adopting the euphonious and comprehensive kilowatt, instead?

The poncelet is the only competing unit, and it is rather deep below the surface of actual events, besides leaving electricians and electrical appliances out in the cold.

THE Olympia truck show demonstrated that with the makers, transmissions and axle constructions are still unsettled matters. But the many divers designs, described somewhere else in this issue, show that two requirements are recognized as essential: reduction of noise and exclusion of grit and dust from the mechanism.

Rands Pays $120,000 for Warren Co.

Cutting Sale Postponed—Ford Reduces Prices—Walpole Tire Bankrupt—Commer Truck To Be Sold Here

DETROIT, MICH., Aug. 5—At the auction sale of the Warren Motor Car Co., carried on by Mr. Baur for the Detroit Trust Co. today, the toal assets were bid in by W. C. Rands, for the Rands Mfg. Co., at $120,000. At the first sale, Mr. Rands' bid of $104,600 was raised by the Peter Smith Heater Co. after the sale was thought to be closed, and the court ordered that the sale be re-advertised. The Peter Smith interests were the next highest bidder in the second sale. The bidding lay entirely between Mr. Rands and the Smith company and was carried on in $500 steps up to the $100,000 mark, after which it was raised by $1,000 bids. The Smith representative retired after bidding $119,000.

Directly after the sale Mr. Rands stated that the new property would be used exclusively for accessory manufacturing and would constitute the third link in a chain that would make the Rands company the largest accessory makers in the world. Because the deal is not quite completed the name of the second property that is being acquired was withheld for the present.

Until the Warren sale is confirmed by the court Mr. Rands will not be in a position to make arrangements for the disposal of the motor car parts and assemblies. For the present, Warren owners will be furnished with what repair parts are in stock, from the factory, in the same manner as under the receivership.

In the bidding on the separate parcels, the Martin Motor Sales Co., of Detroit, made a bid of $17,000 at the first sale and $12,000 at the last sale, for the parts, which, however, was thrown out when the complete assets were sold. Mr. Martin hopes to be able to get hold of the parts, patterns and dies so that he may keep a complete stock of repairs for Warren cars.

Cutting Auction Sale Postponed

DETROIT, MICH., Aug. 5—The receiver's sale of the Cutting Motor Car Co., to have been held at Jackson, Mich., today, has been postponed for not less than 2 weeks, by order of the Federal Court. The Security Trust Co., of Detroit, was appointed receiver upon the petition of an outside creditor, and has been carrying on the business for some time. Last week four other creditors filed a petition in bankruptcy and Judge Sessions ordered the sale postponed until this petition had been acted upon.

Two law suits, distinct from the receivership proceedings, have been commenced by the Wisconsin Motor Co. against the Cutting company and the endorsers of its notes, for motors shipped to them. The Cutting company has withheld payment upon these shipments upon the claim that the motors were defective.

Eveland Combines with Martin Tractor

SPRINGFIELD, MASS., Aug. 4—Samuel S. Eveland, who owns the Hunter and other tractor patents, has entered the Martin Tractor Co., which is under the management of Harry G. Fiske, of the rubber company bearing the latter's name. Thereby all the Martin and Eveland patents are consolidated under the control of one company. The Knox Automobile Co., Springfield, will continue to build the Martin tractors as before.

DETROIT, MICH., Aug. 4—The assets of the Castle Lamp Co., Battle Creek, Mich., have been purchased by John N. Willys. It is planned to move the machinery and stock of material to Toledo, O., where the manufacture of lamps will be carried on to supply Overland cars.

Ford Company Reduces Prices

DETROIT, MICH., Aug. 2—Taking effect yesterday, the following reductions in prices were announced by the Ford company. In the United States, the Model T runabout is reduced from $525 to $500, the Model T touring car from $600 to $500 and the Model T towncar from $800 to $750. In the Dominion of Canada, the prices are also cut from $675 to $600 for the runabout, $750 to $650 for the touring car and $1,000 to $900 for the towncar. These prices will be final for the 1914 season.

The announcement of the reductions is in line with the policy that Henry Ford has held since he entered the automobile industry. It has been his idea to offer the cars at the lowest figure that was consistent with his ideals of quality, and therefore to reduce the selling price as often as increased production would make it possible. Mr. Ford says that these reductions will continue and that, when the yearly output reaches the 500,000 mark, the prices will be considerably lower than they are now.

Sandusky Plant Shut for 3 Weeks

TOLEDO, O., Aug. 4—The Sandusky Auto Parts & Motor Truck Co., of Sandusky, O., has laid off its motor department force of 325 men for 3 weeks. Manager Dan E. Storms gave out an interview to the effect that during the shutdown the capacity of the plant will be increased one-third.

Bank Bankruptcy Involves Walpole

BOSTON, MASS., Aug. 4—Judge Dodge of the U. S. District Court of Boston appointed Robert Fisher of New York City receiver for the Walpole Tire Co. of Walpole, Mass., pending an adjustment of the company's finances. Although the company is entirely solvent, it has become financially embarrassed by the closing of the Atlantic National Bank of Providence, R. I., which was the financial agent for the company. The receivership was granted upon a petition of Rensselaer Curtis of Franklinville, N. Y., who holds a claim against the Walpole company as a receiver for the Atlantic Bank amounting to $121,570. The Walpole company is said to be worth a sum far in excess of its liabilities. Its total assets are estimated at $4,126,635 and the total liability is set at $1,353,359. The Walpole company was formed by men identified with the Walpole Chemical Co., one of the biggest concerns in the country, making all sorts of rubber goods for many years, and which supplies the federal government with about all the tape used for insulation work by the army, navy and other departments. It is expected that the present difficulty will be cleared up quickly and the company will then go on with its product uninterruptedly.

Commer Truck Makers To Sell Here

NEW YORK CITY, Aug 1—A. C. Platt, who formerly was connected with Wyckoff, Church & Partridge, Inc., has been named manager of the American Branch of the Commercial Cars, Ltd., of Luton, Eng., which company has decided to market its U. S. export trade directly. All the business will be done from New York, where a stock of trucks and a complete store of all spare parts will be kept.

Joscelyn Garage Appeals Case

NEW YORK CITY, Aug. 4—An appeal has been filed by the Joscelyn Garage Co., New York City, from the recent decision of the Appellate Division of the Supreme Court of New York. The decision decreed that the 50-foot garage ordinance forbidding the issuance of an operating permit within 50 feet of a school, moving-picture theatre or the like. The filing of the appeal will enable garages who would otherwise be forced to stop business to continue until a final decision has been given by the Court of Appeals at Albany.

Boston Taxi Bankrupt Auction

BOSTON, MASS., Aug. 4—At a hearing in the U. S. Bankruptcy Court last Tuesday before Referee Olmstead, the latter granted the petition of George B. Phipps and C. B. Penney, who were recently appointed the receivers of the Taxi Motor Car Co., of Boston, to dispose of the assets of the company at either private or public auction. Judge Morton of the U. S. District Court directed the receivers to make an inventory of the property, and one was filed fixing the value of the assets at $36,183.07. Of this amount $30,500 is represented by 45 taxicabs and 5 limousines. No schedules have been filed in behalf of the company.

Bablot in Delage Wins at Le Mans

Travels 330-Mile Course at 77 Miles an Hour —Guyot Finishes Second

DRIVER	CAR	TIME	SPEED
Bablot	Delage	4:21:50	76.98
Guyot	Delage	4:26:30	75.40
Pillette	Mercedes	4:27:53	75.38
Salzer	Mercedes	4:34:53	73.35
Duray	Delage	4:35:03	73.30
Lautenschlager	Mercedes	4:36:51	72.74

LE MANS, August 5—*Special Cable.*—Bablot, driving a Delage racer, today won the Grand Prix race of 336 miles, averaging 77 miles per hour, and having approximately a five mile lead on his team mate, Guyot. The race through its entire length was a struggle between the Delage and Mercedes teams, each of which was made up of three cars, and between the two of them they captured the first six places in the race. The Delage victory over the Mercedes was all the more spectacular in that this is the first time that the Mercedes King has raced in France since it captured the Grand Prix race five years ago by Lautenschlager, one of the pilots in today's contest. The final standing of these six leaders is shown herewith.

Sixteen cars cars were due to start in today's race, but at the last minute the Peugeot entries, manned by Bilot and Guyot, were withdrawn, no reason at the present being given. Of the other eight contestants, outside of the Delage and Mercedes teams, were Schneider's, three of which were eliminated, due to broken piston; two were Excelsiors, one an Opal, one a Brasier and the other a Benz.

As in previous Grand Prix races, there were several instances that enlivened the situation and brought the spectators to their feet. One of these occurred at the beginning of the last lap when Bablot could not start his motor after a stop at the pits. It required three different mechanics to get it going. He had lost so much time that he drove the last circuit at an average speed of 85 miles per hour, which is a new record for a lap of a road race course in France.

The race started with Guyot (Delage) leading at the end of the first circuit, but tied in actual time by Christianes in an Excelsior, but the latter's success was shortlived, as he broke a timing gear in the next lap and was eliminated.

The race in the early circuits was animated by two cars taking fire, one being Hornsted in his Excelsior and the other Soldatencow, an amateur driver, handling Thery's Gordon Bennett Brasier racing car, the fires eliminating both machines.

Mores, driving a Benz, was out, due to tire trouble. One of the features of the race from a mechanical viewpoint was the elimination of three Schneider cars, due to breaking of piston, these being driven respectively by Champoiseau, Croquet and Grabriel.

For the first three laps of the race the three Delage cars driven respectively by Bablot, Guyot and Duray held first three places, and the first break in this lead came in the fifth lap when tire and sparkplug troubles delayed Duray and permitted Pilette to bring his Mercedes up to second position, which he held during laps seven, eight and nine, only to be ousted by Guyot in his Delage on the tenth lap.

Seventh place was captured by Thoms in a Schneider. Elashamp in a Mercedes was eighth. For reasons not known at this time the Peugeot entry declined to start.

PARIS, July 30—After limiting the supply of gasoline, it is proposed to limit the number of tires to be used in the next French grand prix. If the proposed rules meet with the approval of manufacturers and the club committee, the cars to line up in the 1914 French grand prix will have a limited supply of gasoline in a sealed tank and seven tires, including the four on the road wheels, with which to cover a distance of 500 to 550 miles. If the motor uses more gasoline than is allowed, or if more than three tires are blown out, that particular racer will have to drop by the roadside.

The gasoline allowance has not yet been decided on. It will certainly not be more than 14.1 miles to the gallon, as allowed this year. It is quite possible that it will be less, for this year's racers all finished with a big supply of gasoline in hand. When once the start of the race is given, the competitors will have to fight it out altogether unaided. There will be no tire pits, probably no water supply, and no spare parts.

It is believed that these rules will tend toward all around efficiency and will bring into prominence the necessity for closer attention to sound tire construction and a design of car which will economize tires. This year's race has already proved the wonderful efficiencies obtained under limited fuel rules, the cars built under these rules more closely approaching standard product than any set yet seen on a race course. It is felt by European makers that it is time to seriously tackle the tire problem, not only so far as it concerns the tire itself, but also as regards the car as a tire eater. Both phases of the problem have been neglected. Although tires this year gave good results, it is certain that they can do better if put to a public test such as this race would afford.

Car manufacturers would also have to pay close attention to the problems of weight, correct balance, clutches and final drive. Already some of the leading French firms have carried out careful experiments with a view to ascertaining the life of tires with various forms of clutches and bevel and worm drive, spring couplings, etc. The result has been really surprising and even more attention will have to be paid to these problems.

GALVESTON, TEX., Aug. 1—The 3-day race meet held on the Beach Pier reached a very successful conclusion Wednesday evening. The crowds being greater than at any previous meet and the program bringing together many of the fastest road and track drivers in the country. The Beach was in excellent condition, the program well managed in every respect and the finances so satisfactory that already plans are under way for larger events and higher cash prizes next year.

The big event of the meet was the 300-mile sweepstake which was run in three heats of 100 miles each, one each day of the meet. Five thousand dollars were divided in prizes by this race alone. It was won by Disbrow in the Simplex who won $2,500 and $500 additional for being the first car to finish in class 5C being 451 to 600 cubic inches displacement. The Stutz was second, winning $1,200. The Case Tornado in third place, won $500, with $100 added for the first finisher in the division 301 to 450 cubic inches. The Studebaker in fourth place won $300 with $100 added being the first finisher in its division.

Two other races were featured on the last day of the meet, one being the 25-mile event for 450 cubic inch cars and under.

The 10-mile handicap was won by Endicott in the Case. In this race Disbrow in his Simplex was heavily handicapped but finished third. During the roce he drove the 10 miles in 754.40.

25 Miles—450 Cubic Inches or Under, Class E

Car	Driver	Time
Peugeot	Ferguson	22:26.10
Case Tornado	Endicott	23:16.95
Stutz	LeCain	24:44.45
Mercer	Horan	25:23.90

10 Mile Handicap, Class E

Case Tornado	Endicott	12:18.40
Mason Special	Rickenbacher	12:24.60
Simplex	Disbrow	12:34.12

300 Miles, Sweepstakes, Class D, Free-for-All, Run in 3 Heats, 1 Each Day

Simplex	Disbrow	257:23.90
Stutz	LeCain	263:25.45
Case Tornado	Endicott	286:21.56
Studebaker	Mosley	322:52.85

Hoosier Run Finished

Parade of 627 Trucks—Selden Has Gasoline Substitute

CHICAGO, ILL., Aug. 6—*Special Telegram*—After 34 days spent in traversing eight states, the Indiana-Pacific tour of the Indiana Automobile Manufacturers' Association, was completed Sunday afternoon, the total mileage for the run from Indianapolis being 3,852 miles. Despite boasted good roads of California, the tourists enjoyed the best and the worst highways of the entire tour in the Golden State.

The drive from San Francisco to this city, a distance of 558 miles, furnished less than 200 miles of excellent roads. With the less than 8 inches of rainfall in 12 months the roads lay 6 to 10 inches in dust or heavy sand. The tourists followed the coast road; they learned to their sorrow that the work of the state was being concentrated on the valley road and that the old oil roads along the coast had not been repaired in 2 years. The San Juan grade between Salinas and San Luis Opispo was as dangerous as the famous Kit Carson Pass through the Sierras and the roads were very rough, the oil crown having broken up and left jagged chuck holes that tested the springs of all the cars, although none were broken. The new Rincon cutoff was not passable owing to the absence of a bridge at Venture, and the tourists were forced to climb the heavy, tortuous and dangerous grades of the East and West Casitas Passes and the Santa Susanna Grade between Santa Barbara and Los Angeles.

The trip down the coast was uneventful except for the atrocious roads. At Salinas, where the tourists, now the guests of the Californians, rode Thursday afternoon, the cars were paraded around the 2-mile track where the annual Wild West show of the state was in progress.

The only accidents of the trip occurred as the goal was being neared. Saturday evening, in Santa Barbara, the Haynes six, in charge of L. R. Wagner, drove out of the Hotel Potter garage and a six-year-old boy stepped backwards in front of the car and was instantly killed, both front and rear wheels passing over him. The accident was unavoidable as Wagner was still in second speed and stopped with his rear wheels 5 feet beyond the prostrate lad. Dr. C. R. Strickland, the Indiana tourist surgeon was called and announced that death was instantaneous. Driver Wagner has been exonerated from all blame by the coroner's jury.

A few minutes before, the G and J truck, driven by Walter Wiedley, the youngest driver on the tour, was wrecked by a Santa Barbara street car.

Wiedley had just turned into the main street of the town and was going about 10 miles an hour when a street car plunging down a steep grade without sounding whirled round the corner and hit the truck a glancing blow. The front wheel was crushed, the radiator damaged and the fenders bent into the body of the car, but Weidley and his mate, G. L. Glickert, escaped without a bruise and the car was able to proceed with the tourists Sunday morning, a new wheel having been obtained from Los Angeles.

On leaving Ventura a large 7-passenger Rambler, driven by W. J. Brown, of that city, carrying his five children and his wife, nosed its way into line. About five miles out, Brown lost control of his car and it plunged down the bank of a straight stretch of road, turning turtle. The Marion roadster and Harroun's Henderson were following closely and the tourists in these two cars set about rescuing the party. Mrs. Brown was the only one injured. The ribs on the left side were broken and her face badly bruised.

—

PHILADELPHIA, PA., Aug. 1—Six hundred and twenty-seven commercial vehicles, making a continuous procession nearly 2 miles in length, participated in the motor truck parade and industrial exhibit conducted by the Philadelphia *Inquirer* and the Philadelphia Automobile Trade Association yesterday. Incidentally, it was a convincing demonstration of the growth and prosperity of the motor vehicle in transportation service of all kinds of businesses.

Included in the line were trucks ranging from light delivery wagons, used principally for transporting small packages, up to giants with a capacity of 15,000 pounds. To drive the demonstration nearer home, most of the entrants were loaded just as they appear day after day in the performance of their duty, making a strong argument for the superiority of the motor-driven truck over horse-drawn equipment as they wended their way slowly throughout the principal business thoroughfares of the city, thence northward on Broad street to the Northeast Boulevard, where about half of them dropped out to go back to work, the others proceeding to Schuetzen Park, where luncheon was served and the cars parked for the afternoon.

The trucks were divided into six groups according to carrying capacities, which formed in streets adjacent to the City Hall, swinging into the vast line on Market street and proceeding east on that thoroughfare to the Delaware river. Each division, carrying a different colored pennant to designate its class, was preceded by a band seated in trucks which considerably livened the procession.

—

Wolverines Beat Chicago Patersonians

DETROIT, MICH., Aug. 4—The Wolverine Automobile Club is rejoicing over the fact that they placed twelve winners out of seventeen entries in their first trial for the Paterson 200-mile prizes, and thereby outdid their rivals, the Chicago Motor Club, which placed nine out of thirteen starters on July 20.

The run was the second of the kind in the country and was held on August 3. The day started out well but threatening storms caused the drivers to hurry and some had difficulty in not finishing in less than the 9 hours set for the running time, while no one anywhere near approached the 10-hour mark set as the maximum time allowable.

One unfortunate accident marred the day and resulted in the painful injury of C. A. Pfeffer, the president of the club.

The results were:

Owner	Observer	Car	Elapsed Time
A. F. Gregor	Dan Carroll	Hupp	9:09
Fred Riddel	Ted McRae	Olds	9:09
C. A. Boid	A. J. Sampson	Oakland	9:15
F. T. F. Stephenson	J. G. Hayball	Ford	9:30
C. A. Pfeffer	John Lake	Chalmers	Ditched
C. F. Curry	.....	Winton	Carburetortrouble
L. N. Taylor	.....	Krit	Spark plug trouble
Gould Allen	.....	Maxwell "6"	Failed to start.
C. A. Woodruff	A. F. Larrabee	Chalmers	9:05
A. P. Chambe	John B. Lyman	Chalmers	9:05
C. C. Cross	Bushnell Merrill	Chalmers	9:02
Ben Marks	H. M. Wirth	Winton	9:00
R. J. Goldie	.....	Chalmers	9:03
R. N. Soule	Geo. R. Beamer	Chalmers	9:03
H. J. Flint	C. A. Smith	Hupp	9:05
Albert F. Mais	.....	Studebaker	4 blowouts
R. C. Kemp	Fred Lowe	Krit	9:10

—

Wisconsin State Tour Postponed

MILWAUKEE, WIS., Aug. 4—The executive committee of the Wisconsin State Automobile Association has postponed the Fourth Annual State Reliability Tour from August 18 to 22 to August 25 to 29, to meet the demands of several leading Milwaukee dealers, who cannot get 1914 models to Milwaukee before August 20. The tour will be conducted under grade 1 rules of the A. A. A.

—

Selken Evolves Highly Active Fuel

ROCHESTER, N. Y., Aug. 4—According to a statement published in one of the local newspapers recently, George Selden, the originator of the famous basic patent which gave rise to the formation of the Association of Licensed Automobile Manufacturers and subsequent legal warfare between this body and the makers not included in it, has developed a fuel which is equal to gasoline in efficacy but costs only half the price. This fuel is peroxidized kerosene, that is to say, kerosene containing a fairly high percentage of hydrogen peroxide.

—

Senate Defeats Tariff Amendment

WASHINGTON, D. C., Aug. 6—*Special Telegram*—A highly spirited debate took place in the Senate yesterday when the automobile paragraph of pending tariff bill was reached. The principal vote of the day came on a motion of Senator Brandegee to increase duties on automobiles. This amendment was defeated by a vote of 21 to 46, all the Democrats and seven Republicans voting against it. Senator Cummins already has offered an amendment wiping out all classifications as to motor cars and applying a general duty of 25 per cent.

This will be voted on later. After 2 hours debate the Senate adopted the amendment reported by the finance committee, which fixes duties on automobiles as follows: Valued at $1,500 or over, 45 per cent.; valued at less than $1,500 and more than $1,000, 30 per cent.; valued at less than $1,000, 15 per cent.; automobile chassis and finished parts of automobiles, not including tires, 30 per cent.

In speaking to the subject Senator Smith, of Michigan, said:

"I simply desire to call the attention of the members of the finance committee to a remonstrance which was filed in this chamber a few weeks ago, signed by every employee in the automobile industry in the city of Detroit against this proposed reduction. I will not dwell upon it.

"I desire to remind my friends upon the other side that the employees in this industry believe themselves to be vitally affected by the changes proposed, do not relish what you are about to give them, and will resent it when the opportunity presents itself."

SENATOR CUMMINS—"I have not been quite able to understand the reasons for arranging the paragraph in the way in which we find it. It is easy to see that it is the apparent purpose of the committee to allow high-priced automobiles to come in at 45 per cent; medium-priced automobiles at 30 per cent., and low-priced automobiles at 15 per cent.

"I cannot understand just why the committee has made up the paragraph in this way. I think the duty is very much higher than necessary anyhow. I am now speaking of the 45 per cent. duty. I think it perfectly absurd to put a duty of 45 per cent. upon automobiles of any kind when there is not that difference in the cost of production. When the people of America want to buy high-priced automobiles, especially of foreign manufacture, they consult only their taste or their pride, and it does not make any difference how much they may be called upon to pay for them. I merely want to correct one statement made by the senator from Mississippi. I have not admitted that the automobile industry needs no protection.

—

NEW YORK, Aug. 6—A demonstrator Columbia car equipped with Brown inner tubes, Scott carbureter and lubricated with Keystone products started to Los Angeles today.

New Wisconsin Law Model Automobile Act

Municipal Permissions for St. Louis Garages Attacked— Lincoln Road To Exclude Utah

MILWAUKEE, Wis., Aug. 4—Wisconsin's new motor code, act of the legislature of 1913, and considered the model state law for the purpose of regulating motor vehicles, went into effect on August 1.

A feature of the new code is that it prevents cities, counties, town boards, park or highway boards from passing or inforcing any ordinance or resolution fixing requirements upon drivers and operators of motor vehicles. The state law is supreme and for 2 years at least Wisconsin motorists and outside motorists who tour in Wisconsin will not be harassed by sundry local ordinances that every cross-roads settlement may wish to pass, as in many other states. The outside motorist who comes into Wisconsin will need only to comply strictly with the compact state law and disregard local restrictions entirely.

The law reads:

"The provisions of section 1636-47 to 1636-57, inclusive, shall be uniform in operation throughout the state, and no city, village, county, town, park board or other local authorities shall have power to enact, pass, enforce or maintain any ordinance, resolution, rule or regulation, requiring local registration, or other requirements * * * or in any manner excluding or prohibiting any automobile, motorcycle or other similar motor vehicle, whose owner has complied with the provisions of said sections, from the free and unobstructed use of all public highways, driveways and parkways within the state . . ."

The asterisks in the above represent the words dropped from the old statute in making up the new law, which were "inconsistent herewith."

Among the requirements in the new law which have heretofore appeared only in local ordinances in various cities are the following:

Prohibiting the use of the muffler cut-out within the limits of any incorporated city or village.

Reducing speed to 8 miles an hour while passing through parks and cemeteries, or by school grounds where persons may be in the highway. The old speed limits of 15 miles an hour in cities and villages and 25 miles an hour in the country are unchanged, excepting as provided above.

Requiring every motor vehicle to be equipped with an "adequate signal device"

Dealers or manufacturers who knowingly permit the use of their number plates on cars owned or controlled by others, are liable to a fine of from $10 to $25.

The law was drafted by James T. Drought, president of the Wisconsin State Automobile Association and a well-known attorney of Milwaukee, who was mainly responsible for the organization of the Milwaukee Automobile Club, the first organization of motorists in the Badger State, and who is still counsel of this club. It was introduced by Senator Alex R. Martin of Milwaukee and was one of the final bills to be passed and signed at the 1913 session of the legislature.

Michigan Buggy Plant Closed

KALAMAZOO, MICH., Aug. 5—The closing of the plant of the Michigan Buggy Co., of this city on August 1, pending a reorganization of the company has created considerable surprise. At a meeting of those interested a force of auditors has been arrasged to look into the affairs of the company and report on plans for reorganization. An inventory of the assets has been ordered.

This company is one of the oldest vehicle manufacturers in the state, and had a capitalization of $500,000. For the past few years it has been building a motor car known as the Michigan 40 with an output of twenty-five cars a day.

Because of the illness of Victor L. Palmer, secretary and financial manager, no statement as to the condition of the company has been issued. According to the company's attorneys the factory will not be permanently closed, and that production in a limited way will be continued right along.

DETROIT, August 6—The Keeton Motor Car Co. of this city has been refinanced and H. H. Newsome, formerly manager of the McCord company and recently of the Hayes Mfg. Co., has been made general manager. Owing to the new arrangements the company's activities will be greatly enlarged. Forest M. Keeton, formerly vice-president and general manager, will act as special factory representative for the establishment of branches, etc. W. G. Houck, previously connected with the sales and advertising department, has withdrawn from the company and will devote his attention to the American Voiturete Co., an organization backed by Charles S. Shaffer, president of the Keeton company.

DETROIT, MICH., August 6—Gray & Davis, Inc., have opened the Sprague-Waldo plant in this city and are installing $70,000 worth of machinery for the manufacture of lamps. Three hundred men are being put to work. Fred E. Holmese, former Detroit representative, will act as manager.

Mound City Garage Ordinance Attacked

ST. LOUIS, MO., Aug. 2—The action of the city requiring automobile dealers to secure permission from the municipal assembly to maintain garages and automobile shops resulted in a suit being filed in the Circuit Court here Friday by thirty-eight automobile concerns to restrain Building Commissioner McKelvey from enforcing the ordinance relating the matter.

The court is asked to declare the ordinance void, on the ground that it is unjust, oppressive and conflicts with the constitution of the United States and that the municipal assembly has no power to prohibit the erection of buildings for business purposes.

The suit is directed against the city of St. Louis and city officials, and the defendants are ordered to show cause on August 12 why an injunction shall not be issued.

In an opinion by Vital W. Garesche, city attorney, the law under which Building Commissioner McKelvey is proceeding is invalid. Garesche said that the Supreme Court of Missouri had decided the law invalid in a suit against a quarry concern by the city. The section of the law under which McKelvey is working is as follows:

"Hereafter no stone quarry shall be opened, no brick kiln, bone factory, rendering plant or livery stable, boarding stable, structure for the storage of automobiles or other vehicles using oil, steam or electricity as a motive power shall be erected, built or established on any lot of ground in the city without permission to do so having been first obtained from the municipal assembly by proper ordinance. Any person guilty of violation of this section shall be guilty of misdemeanor and therefor shall be fined no less than $100 or no more than $500 for such offense."

Convention for Trade Press Efficiency

NEW YORK CITY, Aug. 2—President H. M. Swetland of the Federation of Trade Press Associations in the United States announces that the programme has been completed for the eighth annual convention at the Hotel Astor, New York, September 18 to 20.

Acceptances are in hand from over sixty speakers of national reputation in the manufacturing, selling, advertising and publishing fields. There will be fifty 10-minute addresses at the Editorial, Circulation, Advertising and Publishing Symposiums on vital questions affecting all those who have dealings with the business press of America.

Other features of the convention will be an exhibit of successful class, technical and trade journal advertising campaigns, a big business meeting at which will be told the inside stories of the big trade paper publishing successes, and an inspirational mass-meeting with addresses by representative business and professional men on subjects of live interest to editors, publishers and advertisers.

All the regular sessions of the convention will be open but tickets must be secured for the inspirational mass-meeting. These may be obtained from any member of the Federation or from W. H. Ukers, chairman of the committee on arrangements, 79 Wall street, New York City.

DETROIT, MICH., Aug. 4—An ordinance amendment has been passed by the Detroit Council for the governing of headlights on motor vehicles. Besides the usual requirements as to the number of lights, there is a clause providing that when a vehicle is being operated or left standing on Woodward avenue or several other of the principal streets enumerated, all exposed lights giving an objectionable glare shall either be turned out or the glare eliminated by some satisfactory means.

These provisions are the outcome of several street car accidents in which the motormen have claimed that they had been blinded by the glare of a motor car's headlights.

DETROIT, MICH., Aug. 4—August 1 marked the day on which the price of Michigan automobile licenses was cut in half for the remainder of the year. Up to the present date the number of tags issued has been greater than for the whole year of 1912.

Lincoln Highway to Avoid Utah

DETROIT, MICH., Aug. 4—When in Detroit J. B. Dudley, who assisted Gager on the Western trip of the Indiana-Pacific tour, said that he felt that the final route of the Lincoln Highway would depart from the roads taken by the Hoosiers. The reasons for this opinion were the necessity of rising to an altitude of 11,000 feet and the very chilly reception given by the people of Utah, through which State the Highway was to pass.

U. S. June Exports of Cars $2,191,152

No Injunction for Bidwell in Suit of Northland Rubber Co. vs. International League

WASHINGTON, D. C., Aug. 4—Revised figures on the exports of motor cars during certain periods have just been made public by the federal bureau of statistics. They show that during June 2,039 passenger cars valued at $2,023,761, and 115 trucks valued at $167,391, together with parts, not including engines and tires, were exported. During the corresponding months of 1912, the combined exports of passenger cars and trucks numbered 1,941, valued at $2,116,174. The shipments of passenger cars and commercial vehicles were not classified separately prior to July 1, 1912, hence the comparative figures are not available. The exports of parts, not including engines and tires, during June, 1912, were valued at $361,835.

The year's figures show that during the fiscal year 1913, ending on June 30, 24,293 passenger cars valued at $24,275,793, and 993 commercial vehicles valued at $1,737,141, were shipped abroad, together with $5,240,599 worth of parts, not including tires and engines. The combined exports of passenger and commercial cars during the fiscal year ending June 30, 1912, numbered 21,757, valued at $21,550,139, with parts valued at $4,107,155.

The imports of cars increased from forty-two, valued at $100,927 in June, 1912, to forty-four, valued at $105,516, in June last, and during the fiscal year decreased from 963 valued at $2,134,181, in 1912, to 748 valued at $1,759,380, in 1913. The imports of parts declined in value from $20,408 in June, 1912, to $11,996 in June, 1913, and from $304,144 to $263,827, during the year's period.

Refuses to Restrain A. C. Bidwell

BUFFALO, N. Y., August 6—*Special Telegram*—Alfred C. Bidwell, defendant in the suit for $100,000 for libel brought by the Northland Rubber Co. against the International Automobile League and its officers, came from Toronto, Ont., this afternoon and surrendered to Sheriff Becker. He was arraigned in court and was released under $2,500 bail.

BUFFALO, N. Y., Aug. 5—Justice Frank C. Laughlin in Supreme Court has handed down his decision refusing to continue the injunction sought by the Northland Rubber Co. to restrain Alfred C. Bidwell and others from circularizing the stockholders of the company in an alleged attempt to get them to transfer their stock to the International Automobile League of Buffalo. The court on another motion charging contempt of court for failure of the defendants to obey the order of Justice Edward J. Emery, found the International Automobile League and James J. O'Shea, its manager, guilty of criminal contempt. He fined the league $250 and O'Shea $50. Justice Laughlin finds that there was not a civil contempt as asked for by the plaintiff, but a criminal contempt by reason of the failure of certain of the defendants to obey the order of Justice Emery whether that order was right or wrong.

On the motion a continuance of the injunction order granted by Justice Emery, the court has this basis for its decision:

"It is extremely doubtful whether the complaint states a cause of action inasmuch as it shows an attempt on the part of the plaintiff to cancel and terminate material parts of the contracts, to restrain the violation of which the suit is brought."

In the proceedings Fred D. Russell, with Henry W. Killeen as counsel, appeared for the defendants, while Attorney Thomas A. Sullivan appeared for certain stockholders of the plaintiff and opposed the motions made by George C. Riley, counsel for the plaintiff.

Automobile Securities Quotations

While the changes in stock prices which developed this week were almost unexceptionally small and often fractional, they served to indicate a strong demand, in response to which a goodly amount of trading was done, causing a fairly general advance in prices. Consolidated Rubber Tire preferred was the biggest gainer with 10 points. Overland and Peerless prices rose likewise, and the same applied, though fractionally only, to the Maxwells.

	1912		1913	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com	125	..	150	160
Ajax-Grieb Rubber Co., pfd	95	100	94	100
Aluminum Castings, pfd	100	..	97	100
American Locomotive Co., com	43¼	43¾	30½	32½
American Locomotive Co., pfd	..	..	100½	101½
Chalmers Motor Company, com	..	..	..	113
Chalmers Motor Company, pfd	..	..	97	102
Consolidated Rubber Tire Co., com	12½	14	20	25
Consolidated Rubber Tire Co., pfd	50	59	70	85
Firestone Tire & Rubber Co., com	277	282	278	282
Firestone Tire & Rubber Co., pfd	105½	107½	103	105
Fisk Rubber Company, com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	..
Garford Company, preferred	99	101	92	96
General Motors Company, com	36	37	31¼	34
General Motors Company, pfd	78½	80	75	77
B. F. Goodrich Company, com	74	74¼	30	31
B. F. Goodrich Company, pfd	107	107½	90	91
Goodyear Tire & Rubber Co., com	333	338	295	300
Goodyear Tire & Rubber Co., pfd	104	105	99	100
Hayes Manufacturing Company	..	97	..	..
International Motor Co., com	28	29¼	3	5
International Motor Co., pfd	84¼	95¼	15	25
Lozier Motor Company, com	..	..	16	18
Lozier Motor Company, pfd	..	..	..	90
Maxwell Motor Co., com	..	..	3¾	4¼
Maxwell Motor Co., 1st pfd	..	..	29¼	30¼
Maxwell Motor Co., 2nd pfd	..	..	9	9½
Miller Rubber Company	145	150	134	140
Packard Motor Company, pfd	105	106½	..	99
Peerless Motor Company, com	..	..	30	40
Peerless Motor Company, pfd	..	..	89	92
Pope Manufacturing Company, com	32½	34	10	12
Pope Manufacturing Company, pfd	73½	75	30	33
Portage Rubber Co., com	..	..	35	45
Portage Rubber Co., pfd	..	..	..	90
Reo Motor Truck Company	9¾	10¾	..	10
Reo Motor Car Company	21	24	..	19
Rubber Goods Mfg. Co., pfd	..	..	100	105
Studebaker Company, com	38½	39½	22½	24
Studebaker Company, pfd	95	96	82	86
Swinehart Tire Company	96	99	88	92
U. S. Rubber Co., com	..	..	60¼	60½
U. S. Rubber Co., 1st pfd	..	..	104	104½
White Company, preferred	107½	108½	104	108
Willys-Overland Co., com	..	..	55	58
Willys-Overland Co., pfd	..	..	86	90

Market Changes of the Week

The changes in this week's markets were of small importance, few taking place, and of small dimensions. Both coppers rose $.00 1-8 per pound, though the markets were dull but firm. The copper markets are under shadow of speculative operations in securities. The future is dependent upon the Wall street campaign and the outcome of the strike in the Lake district. Tin rose $.20 per 100 pounds, there being a better demand for future positions. Lead was quiet but steadier since its rise to $4.55 on Monday, a gain of $.20 per 100 pounds. Cottonseed oil lost 15 points in this week's market, closing at $9.40 per barrel. No change of consequence occurred in the petroleum markets this week, both products from the Kansas and Pennsylvania wells remaining firm and unchanged. There was an absence of new developments of interest in the market for automobile scrap rubber. According to importers, a moderate demand is being received for foreign scrap, and with prices abroad firm the market here remains very steady. Domestic scrap is receiving a fair demand from reclaimers. Antimony, beams and channels and Bessemer and open-hearth steels, remained constant. In the chemical market, cyanide potash and sulphuric acid remained at their long-standing steady prices of $.19 and $.90, respectively.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.	.07½	.07½	.07½	.07½	.07½	.07½	.....
Beams & Channels, 100 lbs.	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	26.50	26.50	26.50	26.50	26.50	26.50	.....
Copper, Elec., lb.	.14⅞	.14⅞	.14⅞	.14¾	.14⅞	.15	+ .00⅛
Copper, Lake, lb.	.15	.15⅛	.15⅛	.14⅞	.15	.15⅛	+ .00⅛
Cottonseed Oil, lb.	9.55	9.46	9.41	9.40	9.40	9.40	— .15
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime	.95	.95	.95	.95	.95	.95	.....
Lead, 100 lbs.	4.35	4.50	4.50	4.50	4.55	4.55	+ .20
Linseed Oil	.50	.50	.50	.50	.50	.50	.....
Open-Hearth Steel, ton	26.50	26.50	26.50	26.50	26.50	26.50	.....
Petroleum, bbl., Kansas crude	.98	.98	.98	.98	.98	.98	.....
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy	....	5.00	....	....	5.00	5.00	.....
Silk, raw Japan	....	3.97½	....	....	3.92½	3.87½	— .10
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	40.70	40.20	40.70	40.70	40.70	40.90	+ .20
Tire, Scrap	.09½	.09½	.09½	.09½	.09½	.09½	.....

PURCHASES Motor Appliance Plant—The Hampton Kerosene Carburetor Co., Inc., New York City, recently purchased the plant of the Motor Appliance Co., of America, located at Perth Amboy, N. J. This company is now erecting a large addition to the plant and will be in a position to turn out about 100 carburetors per day.

Kaufman Builds Parts Factory—E. J. Kaufman, Canton, O., will erect a factory for the manufacture of automobile parts.

Chandler Moving Into New Plant—The Chandler Motor Car Co., Cleveland, O., is moving into its new factory this week.

International Buys Land—The International Motor Co. has procured a tract of land adjoining its present Saurer truck plant at Plainfield, N. J., which it will employ as the site for additions to its plants.

Grant Secures Factory—Preparations are being made by the Grant Motor Co., recently organized in Detroit, Mich., to manufacture the Grant car listing at $495, to enter a large factory which has been secured.

Daily Shipment Fifty-One Cars—G. E. Daniels, vice-president and general manager of the Oakland Motor Car Co., Pontiac, Mich., states that the daily shipments of Oakland cars for July was fifty-one cars.

Troy Carriage Co.'s Addition—The Troy Carriage Sun Shade Co., Troy, O., recently completed an addition to its plant, consisting of a two-story structure with 3,500 square feet of floor space. All the departments of the concern have been centralized.

Packard Employes Hold Outing—Seven thousand employees of the Packard M. C. Co., Detroit, Mich., will hold their annual outing on August 11, when steamers chartered by the Packard Recreation League, will carry them to Bois Plane, in the Detroit River.

Allen Co. Builds—Instead of building a large addition to the plant of the Peabody Buggy Co., Fostoria, O., to take care of next year's business, the Allen Motor Car Co. will build at its present location on North street. The contract calls for a two-story brick and concrete building, 98 by 198 feet.

Standard Woven's Framingham Plant—Increased business has forced the Standard Woven Fabric Co., to abandon its old plant at Worcester, Mass., for a new one at Framingham, Mass. In the new factory at Framingham will be found every modern feature tending to promote economy of production.

Plans Increased Magneto Production—The Webster Electric Co. of Tiffin, O., which recently moved its work and headquarters to Racine, Wis., plans to greatly increase its production of magnetos and other ignition devices for gasoline engines. The Webster oscillating magneto is to be featured.

Planning New Baltimore Plant—Contractors in Baltimore, Md., are estimating on the construction of a large automobile manufacturing plant to be erected on Eastern avenue, Canton, O., for the Lord Baltimore Truck Co., from plans by F. C. Lawrence, engineer. The main building will be 125 by 600 feet and two stories high.

Enters New Field—The National Tube Co., Pittsburgh, Pa., announces that commencing August 1 it will enter the electrical conduit field. It has contracted with the National Metal Molding Co. and the Safety-Armorite Conduit Co., both of Pittsburgh, to manufacture and sell this product for it as its agents under their various brands.

Bellefonte's New Factory—A contract has been awarded for the erection of a new automobile factory at Bellefonte, Pa., which will be pushed to an early completion. The building will be 60 by 384 feet in size, two stories high, constructed of native limestone with a structural steel roof, hence will be almost absolutely fireproof. The Bellefonte Six is the car to be manufactured.

New Millimeter-Inch Table—The Ward Leonard Electric Co., Bronxville, N. Y., has devised a new direct reading millimeter-inch conversion table. The beauty of this scale is that measurements may be taken either in inches or in millimeters and converted directly into millimeters or inches respectively at the same glance. It is made of flexible celluloid, about 1 milimeter in thickness.

A. O. Smith Moves Department—To gain more facilities for the production of pressed steel frames and parts, the A. O. Smith Co. has quartered its multiple disk clutch manufacturing department in the works of the Universal Machinery Co., 19th street and St. Paul avenue, Milwaukee, Wis., which is making Progress commercial vehicles. The Smith company is working at the greatest capacity it has ever attained and shipments of frames and other parts during July are more than three times as heavy as during the same period a year ago.

Makes More Ford Figures—The National Acme Mfg. Co., Cleveland, O., has figured out that if all the 0.375-inch nuts sold the Ford Motor Co., Detroit, Mich., if placed side by side, would form a miniature tunnel from the Acme plant at Cleveland, O., to the Ford plant in Detroit, and extend 25 miles up into Michigan. Twenty-two carloads of steel bars were used in the manufacture of the 4,500,000 nuts used on Ford cars. If the copper wire used in the magnetos on the 200,000 Ford cars made this year were straightened out into on wire it would form a strand 38,400,000 feet long, 7,274 miles, almost enough to reach around the earth. There are sixteen spools, each wound with 12 feet of copper wire, in each magneto.

The Automobile Calendar

Shows, Conventions, Etc.

October	13	Philadelphia, Pa., National Fire Prevention Conference. Philadelphia Fire Prevention Commission.
Oct.	27-28	Chicago, Ill., Convention of Electric Vehicle Association of America.
Dec.	9-12	Philadelphia, Pa., Annual Convention of American Road Builders' Association.
Dec.	11-20	New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.

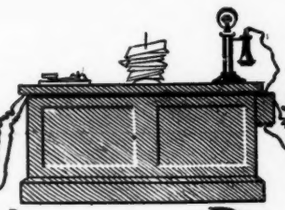
Race Meets, Runs, Hill Climbs, Etc.

Aug.	7	Amarillo, Tex., Track Race.
Aug.	9	Brighton Beach, N. Y., Track Race, Motor Dealers' Contest Association.
Aug.	9	Santa Monica, Cal., Road Race, Santa Monica Road Race Committee.
Aug.	10	Pueblo, Tex., Track Race.
Aug.	12	Kansas City, Mo., Reliability Tour, Kansas State Automobile Assn.
Aug.	15-16	Denver, Colo., Track Race.
Aug.	18-20	Milwaukee, Wis., Fourth Annual Wisconsin Reliability Tour, under the auspices of the Wisconsin State Auto mobile Assn.
Aug.	25-28	Houston, Tex., Reliability Run, Houston Auto Club.
Aug.	25-30	Cleveland, O., Midsummer Show, Forest City Fair, Cleveland Automobile Show Co.
Aug.	29-30	Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.
Aug.	30-Sept. 6	Chicago, Ill., Reliability Run, Chicago Motor Club.
September		Grand Rapids, Mich., Tour, Grand Rapids Auto Club.
Sept.	1	Columbus, O., 200-Mile Track Race, Columbus Automobile Club.
Sept.	8-13	Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.
Sept.	9	Corona, Cal., Track Race, Corona Automobile Assn.
Sept.	12	Canfield, O., Track Meeting, Canfield Fair Assn.
Sept.	13	Covington, Ky., Track Meeting, Cincinnati Automobile Club.
Sept.	13	Grand Rapids, Mich., Track Races, Grand Rapids Automobile Club.
Sept.	20-21	Detroit, Mich., Track Races, Michigan State Fair.
Nov.	4-5	El Paso, Tex., Road Race to Phoenix, Ariz.
Nov.	4-5	Los Angeles, Cal., Road Race to Phoenix, Ariz.
Nov.	4-5	San Diego, Cal., Road Race to Phoenix, Ariz.
Nov.	6	Phoenix, Ariz., Track Meeting, State Fair.
Nov.	24	Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov.	27	Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign

Aug.	28-30	Ghent, Belgium, Institute of Metals, Annual Autumn Meeting, Ghent International Exhibition.
Sept.	21	Boulogne, France, 3-Litre Race.
Sept.	25	Isle of Man, International Stock Car Race.
October	17-28	Paris, France, Automobile Show, Grand Palais, 10 days.
November		London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry



Engineer — Dealer — Repairman — Garage

OLDSMOBILE VETERANS' REUNION—When eighteen of the old timers from the Olds Motor Works, Detroit's first automobile factory, got together on the top deck of the City of Detroit III on the recent trip of the S. A. E., they thought it was time to organize the "Old Crew" into permanent society. A committee was formed to bring about a meeting and banquet in the near future. One of the qualifications for membership will be employment by the Olds before the year 1905, together with active participation in the automobile field of today. The whole idea of the plan is to get these veterans of the industry for the sake of renewing the old friendships.

WOOD SALESMANAGER—H. A. Wood has been appointed salesmanager of the Big Four Auto Co., Los Angeles, Cal.

OPEN GAULOIS TIRE AGENCY—Edgar Walker has opened an agency for Gaulois tires at 127 Bay street, Toronto, Ont.

METZ'S BOSTON FACTORY BRANCH—The Metz Co., Waltham, Mass., has opened a direct factory branch at 887 Boylston street.

NEW MOTZ AGENCY—The Hall Rubber Co., 1402 Ridge avenue, Philadelphia, Pa., has taken the agency for the Motz tires.

EVANS SEATTLE MANAGER—George Evans has been appointed manager of the Olympic M. C. Co., Seattle, Wash., succeeding C. W. Dansie.

STEPNEY WHEEL MOVES IN TORONTO—The Stepney Motor Wheel Co. has removed to its new premises at 120 King street, East, Toronto, Ont.

SQUARE HORN MOVES TO NEWARK—The Square Motor Horn Co. has moved from New York City to its new quarters at 328 Adams street, Newark, N. J.

MUNROE ALCO MANAGER—S. W. Munroe has been appointed sales manager of the American Locomotive Co., Providence, R. I., with headquarters in Denver, Colo.

TAKES STROMBERG AGENCY—The Electric Manufacturing Co., 162 West 6th street, St. Paul, Minn., has taken the distribution agency for Stromberg carburetors.

MCMULLEN MCCUE DISTRIBUTER—R. B. McMullen, with offices in Chicago, Ill., and Detroit, Mich., has been appointed distributer for the McCue Co., Buffalo, N. Y.

BURT RUSSELL FACTORY MANAGER—C. R. Burt, of Rockford, Ill., has been appointed factory manager of the Russell M. C. Co., Toronto, Ont., succeeding Mr. McDonald.

BUNKER SUCCEEDS HORNBERGER—Arthur Bunker, of Seattle, Wash., has succeeded H. L. Hornberger as manager of the big new San Francisco Cal., branch of the Oakland M. C. Co.

BISSEL STEARNS WHOLESALE MANAGER—L. E. Bissel has been appointed wholesale manager for the F. B. Stearns Co., Cleveland, O., in the territory controlled by the Atlanta, Ga., branch.

LYONS IN INSOLVENCY—Charles E. Lyons, doing a motor business at 721 Norfolk street, Boston, Mass., has just been petitioned into insolvency. He has liabilities of $2,268 and assets of $200.

COLUMBUS INTER-STATE MOVES—The Columbus, O., agency for the Inter-State line has moved from North Fourth street to the corner of Maple and High streets, where a large salesroom has been secured.

YOUNG INTERNATIONAL FACTORY MANAGER—The International Motor Co., has appointed T. G. Young manager of its new factory branch in Seattle, Wash., for the distribution of Mack, Sauer and Hewitt trucks.

MT. TACOMA'S BUS LINE—An automobile stage service to Mt. Tacoma, Wash., has been inaugurated by the White Garage, Tacoma, Wash. A new ten-passenger White will make the round trip of 120 miles each day.

COLEMAN WITH ATTERBURY—J. R. Coleman, formerly with the Chalmers and Packard companies, and lately of the E. R. Thomas Co., has returned to Detroit, Mich., to take up the duties of chief engineer of the Atterbury Motor Co.

LOUISVILLE HENDERSON MOVES—The Hiter Motor Car Co., agent for the Henderson, has moved its salesroom from the Franklin building on Fourth avenue near Broadway to the northwest corner of Fourth and York streets, Louisville, Ky.

HAND WITH MARION—E. R. Hand, formerly of the E. R. Thomas Motor Car Co., and of the Abbott Motor Co., has left Detroit, Mich., to become district manager in the Middle West for the Marion Motor Car Co., of Indianapolis, Ind.

ROMMEL CO. MOVES—The Rommel Motor Car Co., Louisville, Ky., distributors of Studebaker and White cars, has closed up its office and salesroom at Fourth and York streets. Its headquarters hereafter will be at 901 East Broadway.

HARTFORD ACCESSORY STORE BANKRUPT—The Auto Owners' Supply Co., which conducted an accessory store at 384 Trumbull street, Hartford, Conn., for the past few months is in the receiver's hands. C. H. Latham has been appointed receiver.

KELLY BAKER SECRETARY—G. H. Kelly has been advanced from the position of manager to the truck department to the office of secretary and sales director of the Baker Motor Vehicle Co., of Cleveland, O. E. J. Bartlett become sales manager of the truck department.

OAKLAND IN NEW QUARTERS—The New England branch of the Oakland Motor Car Co. has been moved from Boylston street, Boston, Mass., to the corner of Massachusetts avenue and Newbury street in that city, where the United Motor Boston Co. had its salesrooms.

CONNECTICUT BUS LINE FORMED—The North Stamford Auto Bus Line has been organized with a capital stock of $10,000 in shares of $25. It is planned to operate three busses along the route which will include North Stamford, Conn., Long Ridge and other points.

MOTOR CLUB IN TOLEDO—Efforts are being made in Toledo, O., for the formation of a motor club. Toledo has more automobiles in proportion to its population than any other city in the country and it is contended that a club is essential for the interests of motorists generally.

MAXIM TRICAR APPOINTS AGENTS—The Maxim Tricar Mfg. Corp., New York City, has appointed A. C. Vanderpool to manage its export trade. The British Motor Depot, Copenhagen, Denmark, and the New York Garage, L. Bousquet & Co., Paris, France, have also been appointed agents.

SEATTLE'S NEW GARAGE—One of the largest building projects in Seattle, Wash., is the garage of the Harvard Bldg. Co. on Boylston avenue. This is the largest building devoted exclusively to automobiles in the Queen City, having 1 acre of floor space. The building will cost when completed, $100,000.

SNOKE STUDEBAKER SALES MANAGER—C. H. Snoke has recently been appointed sales manager of the Studebaker Corp., of Canada, Ltd., and will have his headquarters at the plant in Walkerville, Ont. It is interesting to note that Mr. Snoke has been connected with the Studebaker ever since he was 14 years of age.

MOTORIZING BRAZILIAN P. O.—Motor vans are being installed by the Brazilian post office departments. Six cars of this class have been imported from Germany. If their operation proves economical it is understood that further orders will be placed by the government. The new cars are being used in Rio de Janiero exclusively.

SECURE TRUCK TIRE PATENT—C. E. Herman and S. C. Munson, of 55 West Blake avenue, Columbus, O., have secured a patent on a new motor truck tire and are organizing a company to manufacture the tire. The principal feature of the tire is a steel shoe which is fitted on the tread of the tire to receive the wear.

UNDERGROUND GARAGE FOR CHICAGO—Mayor Harrison recently submitted to the South Park Commissioners a proposition of the Chicago (Ill.) Automobile Club to build a public garage under Grant Park and turn it over to the city free from encumbrances as soon as the garage earned enough money to reimburse the club.

USES GASOLINE 20 YEARS OLD—After a tank of gasoline had been buried 20 years, Rev. Charles K. Weller, of Anniston, Ala., dug it up and filled his motor tank and found it in perfect condition. The tank had been buried in connection with a lighting system used in the house years ago and it was dug up by accident.

WILL STRENGTHEN BRIDGE—The selectmen of the town of New Hartford, Conn., have arranged for the opening of the Satan's Kingdom bridge which has been strengthened to meet load up to 10 tons. The town is unable to erect a new bridge at present. For some time past a detour has been necessary, which has caused much delay and annoyance.

ALLEN BROS. MANUFACTURING TIRES—H. K. Allen and A. K. Allen, prominent in the automobile tire business in Seattle, Wash., announce that they will shortly manufacture tire casings in that city on a large scale. The tread is the invention of A. K. Allen, and consists of what is called counter sunk and knob. It is purely a non-skid product and is guaranteed for 4,000 miles.

KANSAS CITY ROAD PROJECT—To encourage city folks to take part in the two road building days, August 20 and 21, the Automobile Club of Kansas City, Kans., through its vice-president, Judge Harry G. Kyle, announced recently that 200 members had pledged the use of their automobiles for the purpose of conveying volunteer workmen to their assigned places along the roads that are to be improved.

BENSON DISTRICT SALES MANAGER—F. C. Benson, formerly president of the James Auto Co. and now with the American Locomotive Co., Providence, R. I., has been appointed district sales manager of its Western territory. His headquarters are for the present in Minneapolis, Minn., and his territory includes Montana, North Dakota, South Dakota, Nebraska, Minnesota, Iowa and part of Wisconsin.

WHITE MOVES TO NEW BUILDING—The New England branch of the White company moved recently to its new home on Commonwealth avenue, Boston, Mass., where it has more than an acre of ground and a large building that will give adequate facilities for looking after pleasure and commercial vehicles. One of the downtown garages will be continued in use and the other has been transferred to a real estate company.

GOVERNOR ALSO WORKS ON ROADS—Governor Emmett O'Neal, of Alabama, who has decreed Aug. 14, 15 and 16 as Good Roads days, will do manual labor during that time on the road. He asks that every citizen either give 3 days' labor or contribute 3 days' wages. By a state-wide co-operative movement of this kind the governor hopes to make such a showing on the roads that it can be made a yearly feature in Alabama.

STOPPING MUFFLER CUTOUT NUISANCE—To stop the muffler cutout nuisance and other violations of the automobile ordinance citizens in Minneapolis, Minn., have been provided with post card forms on which they may make report to the superintendent of police with name, number of car and the time of the offense. One offender against the speed ordinance has been sentenced to stay out of automobiles until October 1. In case of lapse he will receive a police court sentence.

HONDURAS BUILDING AUTOMOBILE ROAD—Owing to the construction of a railway between Tela, Honduras, on the Caribbean coast and Tegucigalpa, the capital, an automobile road is being built along the right of way. The American engineers in charge of construction will use automobiles in getting to the different portions of the work. There is talk of installing an automobile service over this road to be used during the period of construction. At present Tegucigalpa is almost inaccessible from the Atlantic side.

IMPORTANT CHANGE IN DETROIT—The most important change in some time along Detroit's newer automobile row is the purchase of the W. J. Marshall Auto Co. by the Wetmore-Quinn Co. The Marshall company, under the management of R. Albertus, was the agent of the Paige-Detroit car in that territory and also carried on a garage business, in which lines its successor will continue. It is also probable that it will add another line when larger

quarters are moved into in the near future. This company is extremely strong in both personal and financial stability, being incorporated at $50,000.

WILL STUDY MANAGEMENT—What is believed to be the first school of its kind for the study of scientific management will be conducted in Providence, R. I., this month by F. B. Gilbreth, of New York City. The students will be college professors from the institutions which have introduced or are planning to introduce business courses dealing with the newest factor in the industrial field. All phases of scientific management will be included, with motion study by means of moving pictures and other devices that have been applied to the subject. A number of efficiency engineers will give lectures.

NEW TAXICAB RULE—In order to protect the public in New Orleans, La., as much as possible from unscrupulous taxicab drivers the city commissioner has ordered that a slip bearing the time must be handed the passenger when the cab is hired. The new ordinance provides also that baggage up to 100 pounds must be carried free. Within the district where the fare is limited to 50 cents for each direct trip a charge of 10 cents only is allowed for each extra passenger. A copy of the entire tariff must be attached to the interior of every public automobile, where it can be seen readily. A loose copy must be at hand for consultation if the passenger demands.

TRANSCONTINENTALISTS WILL RECEIVE $7,500—With wagers of no less than $7,500 depending on the successful completion of a cross continent drive from Los Angeles, Cal., to New York City, C. H. Smith, a theatrical man of San Francisco, started on July 10. He must make the trip in 60 days and must make his own repairs. The machine is equipped with Miller one cure wrapped tread tires, and hereupon hangs another portion of the bet. The W. D. Newerf Rubber Co., San Francisco, Cal., claims that six tires would carry the car to New York and that four of them would be free from blowouts and kindred troubles on its arrival. Ed. Leonard wagered $2,000 that the tires would fall down.

PERRY CENTENNIAL MOTOR PARADE—A prize parade of motor cars will be the feature of the third day's celebration of the Perry Centennial at Milwaukee, and the Perry Centennial committee has asked all motor car owners in the city to compete for the four large silver trophies donated for the purpose by business men. Owners are asked to conceive red, white and blue color schemes in decorating their cars. Officials of the Milwaukee Automobile Club will act as judges and the club will present a large delegation of decorated cars in the parade. The celebration will last five days, during which time the rehabilitated brig on which Commodore Oliver Hazard Perry upheld the supremacy of the United States on the Great Lakes will come into Milwaukee harbor.

DORRIS TRUCK'S OVERLAND RUN—A 2-ton Dorris truck, loaded with a 7-passenger Dorris touring car, started for Chicago from the Dorris factory in the central west portion of St. Louis recently. The trip, which primarily was to establish new Dorris agencies en route, if completed will be the first truck tour from St. Louis to the Illinois metropolis. No attempts will be made at speed and stops will be made at Springfield, Litchfield, Bloomington and Pontiac, where agencies will be established. The pleasure car and the truck are for delivery to the new Chicago agency of the Dorris people. Tours by trucks are not frequent, and in the Indiana-Pacific tour which passed through St. Louis last week was a Brown 1,500-pound truck which leisurely jogged along, consuming 2 days in crossing the State of Missouri.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BUFFALO, N. Y.—Biggam Engineering Co. Inc.; capital, $200,000; to manufacture transmissions, clutches, and other automobile parts, and to operate general machine shop. Incorporators: H. F. Biggam, N. D. McDowell, C. E. Buck.

CHICAGO, ILL.—Electric Auto Sales and Rental Co.; capital, $12,000; to deal in automobiles. Incorporators: Nathaniel Rubinkam, H. F. Tucker, Grover McLaren.

CHICAGO, ILL.—Michigan Motor Car Co. of Chicago; capital, $25,000; to deal in automobiles. Incorporators: W. J. Pierce, E. D. Stuntluff, Maurice E. Stuntluff.

CLEVELAND, O.—Arter Auto Body Co.; capital, $20,000; to manufacture automobile bodies and automobiles. Incorporators: Edward Younger, F. S. Rice, J. S. Castle, W. E. Freese, W. T. Redmond.

CLEVELAND, O.—Modern Garage Co.; capital, $100,000; to deal in automobiles. Incorporators: E. E. Terrell, A. F. Pliske, M. F. W. Pliske, R. M. Ostrander, V. E. Davis.

COLUMBUS, O.—Weller Motor Co.; capital, $10,000; to deal in automobiles. Incorporators: G. L. Weller, W. G. Sharp, D. J. Nye.

DETROIT, MICH.—Overland Detroit Co.; capital, $10,000; to deal in automobiles. Incorporators: C. E. Baker, Hugh O. Donnell, S. C. Fisk.

INDIANAPOLIS, IND.—J. I. Handley Co.; capital, $1,250,000; to deal in automobiles. Incorporators: J. I. Handley, V. A. Longaker, D. S. Menasco.

KANSAS CITY, MO.—Jackson Motor Co.; capital, $10,000; to deal in automobiles. Incorporators: W. E. and I. M. Mallory, Ivan de Mitkiewicz.

MARTINSVILLE, IND.—Citizens Automobile Co.; capital, $25,000; to deal in automobiles. Incorporators: W. E. Hendricks, W. A. Kennedy, E. I. Poston, G. Cramer, T. A. Hendricks.

MILWAUKEE, WIS.—Chase Motor Truck Service Co.; capital, $25,000; to deal in motor trucks. Incorporators: L. C. Pauly, Ella Pauly, Louis Fernhaber.

MISHAWAKA, IND.—Rubber Regenerating Co.; capital, reduced from $1,550,000 to $1,500,000.

NEW YORK CITY—F. D. Homan, Inc.; capital, $2,000; to deal in motors, etc. Incorporators: F. D. Homan, Benjamin Jackson, Alphons E. Kannengeiser.

WILMINGTON, DEL.—American Motors Co.; capital, $500,000; to deal in automobiles. Incorporators: F. A. Hyde, F. B. Smith, C. G. Guyer.

WILMINGTON, DEL.—McCord Automobile Co.; capital, $500,000; to deal in automobiles. Incorporators: H. E. Latter, W. J. Maloney, N. P. Coffin.

WILMINGTON, DEL.—Bigelow-Wiley Motor Co.; capital, $50,000; to manufacture automobiles.

GARAGES AND ACCESSORIES

AKRON, O.—Seaton Metal Products Co.; capital, $20,000; to manufacture and deal in automobile accessories and to operate a machine shop. Incorporators: L. J. Rothenbecker, Charles A. Seaton, W. O. Lee, C. F. Miller, Charles Scimeca.

CANTON, O.—Forrest Rubber Co.; capital, $10,000; to deal in all kinds of rubber goods including automobile tires. Incoprorators: H. H. Forrest, E. C. Purdy, A. D. Evans, F. J. McMillan, Walter Kline.

CHICAGO, ILL.—Automobile Service Co.; capital, $30,000; to carry on an automobile bus line. Incorporators: H. Decker, S. J. Richman, P. R. Mayor.

CHICAGO, ILL.—Chicago Tire Goods Co.; capital, $10,000; to deal in automobile tires. Incorporators: Louis Dulsky, Samuel Dulsky, J. E. C. Blake.

CHICAGO, ILL.—Stewart Auto Accessories Co.; capital, $1,500; to manufacture and sell automobile accessories. Incorporators: F. W. Stewart, L. L. Kennedy, J. A. Steven.

CHICAGO, ILL.—Turbine Muffler Co.; capital, $2,400; to manufacture mufflers. Incorporators: Joseph Libal, G. W. Gardner, J. J. Karthelser.

CLEVELAND, O.—General Auto Parts Co.; capital, $10,000; to repair automobiles. Incorporators: F. C. Walsh, M. Kenke, William Radtke.

DOVER, DEL.—Consolidated Auto Supply Co.; capital, $500,000; to deal in automobile accessories. Incorporators: H. O. Coughlan, F. Schmidt, J. M. Satterfield.

EL PASO, TEX.—El Paso Rubber Vulcanizing & Auto Supply Co.; capital, $10,000; to deal in automobile accessories. Incorporators: C. W. Mace, William Mace, Charles Fowser.

NEW YORK CITY—Bobra Spark Plug Co.; capital, $12,000; to manufacture spark plugs and other automobile parts. Incorporators: Wm. Bohleber, C. H. Braselton, C. L. Bundy.

NEW YORK CITY—Caledonian Oil Co.; capital, $10,000; to produce and deal in lubricating oils, etc. Incorporators: J. E. Hernandez, A. B. Brushaberm, H. Hess.

NEW YORK CITY—Knight Tire & Rubber Co.; capital, $5,000; to deal in automobile tires. Incorporators: J. C. Nichols, W. B. Highes, D. L. Fultz.

NEW YORK CITY—J. J. Fero, Inc.; capital, $20,000; to deal in automobile tires. Incorporators: J. J. Fero, F. D. Brown, W. S. Foos.

NEW YORK CITY—Motor Owners Associated, Inc.; capital, $10,000; to conduct a club. Incorporators: J. C. Travis, C. L. Clune, M. M. Hovey.

NEW YORK CITY—Zip Sales Agency, Inc.; capital, $15,000; to deal in automobile accessories. Incorporators: G. W. Phillips, Jr., V. W. Cutting, A. E. Hall.

NORTH STAMFORD, CONN.—North Stamford Auto Bus Line; capital, $10,000; to operate three buses.

ST. LOUIS, MO.—Keppel Mfg. Co.; capital, $50,000; to manufacture and deal in check valves, automobile starters, etc. Incorporators: T. H. Keppel, R. F. and Jesse Keppel, Jr., William Weber.

ST. LOUIS, MO.—Prest-O-Lite Co.; capital, $800,000; organized under the laws of the State of New York, was licensed to do business in Missouri.

ST. LOUIS, MO.—Sta-Tite Packing Ring Co.; capital, $3,600; to manufacture packing rings and automobile accessories. Incorporators: E. B. Campbell, C. N. Drake, W. H. Keys.

WILMINGTON, DEL.—DeWitt Muffler Co.; capital, $30,000; to manufacture automobile parts. Incorporators: C. E. DeWitt, A. L. Downey, R. B. Rupert.

WILMINGTON, DEL.—Latrobe Automobile Turn-Table & Jack Co.; capital, $100,000; to manufacture garage accessories. Incorporators: J. Gilligan, T. H. Griffin, W. B. W. Bryan, N. L. Rogan, C. J. Jacobs.

CHANGES OF CAPITAL AND NAME

CARROLLTON, O.—Columbia Rubber Co.; capital increased from $100,000 to $500,000.

CHICAGO, ILL.—Rubber Plant Co.; capital decreased from $100,000 to $1,000.

COLUMBUS, O.—J. W. Brown Mfg. Co.; capital increased from $490,000 to $640,000.

TOLEDO, O.—Overland Stores Co.; capital increased from $10,000 to $100,000.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Boston, Mass.	Hupmobile	Wentworth-Fosdick Co.
Brooklyn, N. Y.	Hupmobile	Diuguid Bros.
Canton, O.	Fiat	W. H. Barger Co.
Canton, O.	Rambler	W. H. Barger Co.
Canton, O.	R-C-H	W. H. Barger Co.
Columbus, O.	King	Shisler & Bidlack
Columbus, O.	Read	Auto Inn
Columbus, O.	Speedwell	Murnan Taxicab Co.
Lawrence, Mass.	Studebaker	Herbert Ellis
Los Angeles, Cal.	American	L. C. Buxton
Los Angeles, Cal.	Cole	Brundy Co.
Louisville, Ky.	Chandler	Louisville Lozier Co.
Louisville, Ky.	Kissel Kar	T. M. Carr
Marion, Ind.	R-C-H	Shawley & Stick
New York City	Hupmobile	C. E. Riess
Ridgeville, Ind.	R-C-H	J. C. Carpenter
San Francisco, Cal.	Hudson	H. O. Harrison Co.
Seattle, Wash.	McFarlan	Gerlinger M. C. Co.
St. Clair, Pa.	R-C-H	S. H. Daddow
Springfield, Mass.	Hudson	J. S. Harrington
St. Louis, Mo.	Marion	Lewis Auto Co.
St. Louis, Mo.	R-C-H	Weber Implement & Auto Co.
St. Louis, Mo.	Selden	Peerless Sales Co.
Tacoma, Wash.	Henderson	R. W. Crouch
Taunton, Mass.	R-C-H	Shorts Garage
Terry, Mont.	R-C-H	L. W. Lamb
Trenton, N. J.	R-C-H	Joseph Kelso
Upper Sandusky, O.	Studebaker	C. W. Ketterman
Wichita, Kan.	R-C-H	Jones Auto Exchange
Wichita, Kan.	Wahl	J. J. Jones

COMMERCIAL VEHICLES

Los Angeles, Cal.	Cartercar	California Moline Plow Co.
Los Angeles, Cal.	Westcott	A. C. Lusby
San Francisco, Cal.	Indiana	Auburn Sales Co.
Springfield, Mass.	Stewart	J. S. Harrington

FORD Car Cigar Lighter—Fig. 1 shows a recent addition to the line of the Metal Specialties Mfg. Co., Chicago, being a device for lighting cigars while riding on a Ford car. The Presto lighter consists of an insulator housing of watch-like shape, in which there is a spiral platinum wire and a mica sheet above it. Connected to the ends of the platinum wire are two conduits, one of which is secured to the magneto or commutator, and the other grounded on the car whenever the device is desired to be used. If this is done and the button on top of the instrument is pressed, current is passed through the insulated cable attached to the lighter, the wire and mica begin to glow and turn hot enough for lighting a cigar or cigarette on them. The wires are heavily insulated with rubber and wound with silk. To keep the lighter in a handy position, it is furnished with a support made of nickel-plated steel which has four spring ends, between which the device is pressed. Asch & Co., 1777 Broadway, New York City, handle this product in the East.

Stalit Heating Plug—George Staats & Co., 252 Lorimer street, Brooklyn, N. Y., manufacture the Stalit plug, Fig. 2, which serves for heating the air in the intake manifold before cranking, thereby making starting easy, which is specially desirable in winter. The plug consists of a brass body with one tapered end equipped with a terminal screw S, permitting of attaching a wire to it; while the other end is thin at T and fitted with a flange F, the thin portion being wound with mica and being adjacent to a section having a 0.5-inch thread on it. This may be threaded into the intake manifold, after having tapped the latter correspondingly, the flanged end of the plug being brought close to the facing side of the manifold, so that, if the outside terminal is connected to the distributer and the manifold is grounded, a switch between the battery and the manifold closes the circuit and the air surrounding the plug and in the manifold interior is heated. This is done by a coiled wire inclosed in the paper wound end of the plug, inside the manifold space, which coil forms an electrical resistance resulting in the development of heat. A 6-volt circuit should be used for the purpose of operating this plug.

Fosnacht Valve Reseater—The National Auto Specialty Mfg. Co., Tama, Ia., makes the reseater shown in Fig. 3. This device can be used either for grinding the valve face or the seat. In the former case, here seen, the valve stem is fitted in the stem holder, and the inclined face of the valve bears against the grinding face formed in the lower or wider portion of the device. The stem is held in place and alignment in a suitably shaped collar, being held tight in place by a screw. A cross handle on the upper end of the sleeve which is threaded around the collar serves for moving the valve slowly upward, whereby it is also rotated, and, being in contact with the grinding face on the device, is smoothed down to the degree of good seating. If the seat is to be ground, the cutter is screwed on to the outer thread of the piece which formerly held the end of the valve stem, so that the inclined teeth of the cutter bear against the face and grind it, the proper alignment being insured by the stem of the cutter which fits the valve guide on the cylinder.

Blitzen Carbon Chaser—The same company which makes the Fosnacht reseater also manufactures the Blitzen carbon remover, which comes in the form of small cubes of soft material put in the cylinder before starting. While the material is soft enough not to scratch cylinder and piston surfaces, the carbon deposits thereon are broken up and pass through the exhaust openings together with the scraped-off deposits, leaving the surfaces clean.

Raymond Automatic Carbureter—The Raymond Carbureter Co., Des Moines, Ia., manufactures the carbureter, Figs. 5 and 6, which is automatic in its operation and distinguished by two special features, these being the construction of the fuel nozzle and of the auxiliary-air supply parts. The carbureter is of the eccentric float type, a metal float F regulating the supply of fuel. A horizontal passage from the float chamber leads below the nozzle N, and the by-pass S supplies gasoline for easy starting, the small butterfly which controls the by-pass being operated through an arm A movable by hand. The gasoline passing from F to N rises in the latter and after leaving it enters a surrounding chamber,

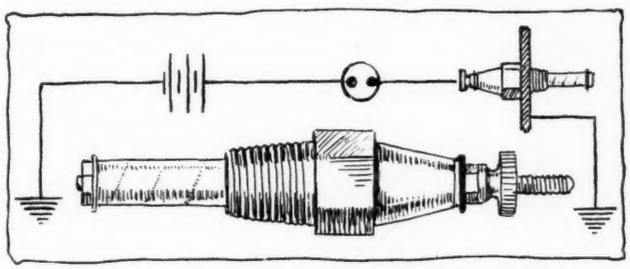


Fig. 2—Stalit starting-air heating plug for manifold

when it passes into the mixture chamber just beneath the valve V. Air enters through H2, rises around the gasoline feed pipe G, and through air holes H enters the nozzle body which it leaves, playing around the fuel outlet and becoming thoroughly mixed with the gasoline. Auxiliary air is supplied through the two plates H1 which are moved by the engine suction and are so linked by a fulcrum that if the upper plate moves up, the lower one is depressed, the ring-shaped aperture between them being thereby deepened. The amount of air passing through the auxiliary port formed by the two plates is, of course, dependent upon the motor suction, and as a rich mixture is needed for starting, provision is made for excluding the auxiliary air port from action entirely at that time. This is done by means of the cover valve V, which is called the strangler valve. The adjusting thumb nut determines the height of this valve over the upper plate, spring S1 serving for maintaining this adjustment, while the lever L pivoted on the lock nut L1 permits of depressing the stem carrying V until the latter contacts with the upper plate H1. The lever L can be easily operated by a wire which passes through the radiator and can be drawn tight, thus closing the auxiliary ports while starting. In addition, the arm A may be used for additional priming, if cold weather makes it necessary.

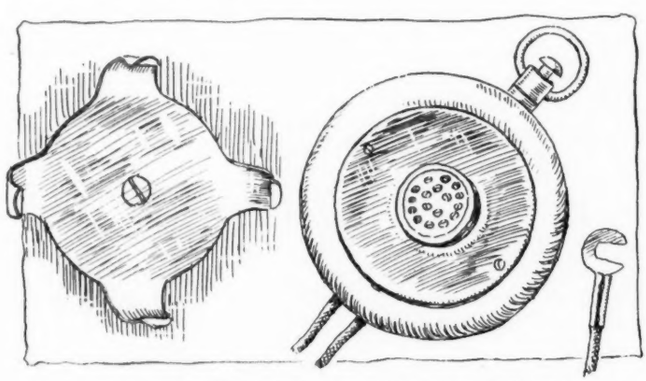


Fig. 1—Presto electric cigar lighter for Ford cars

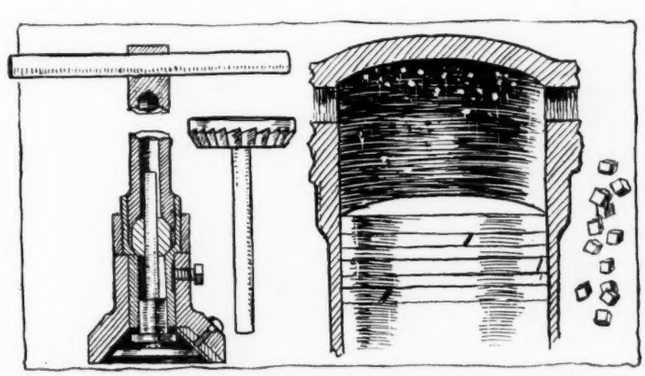
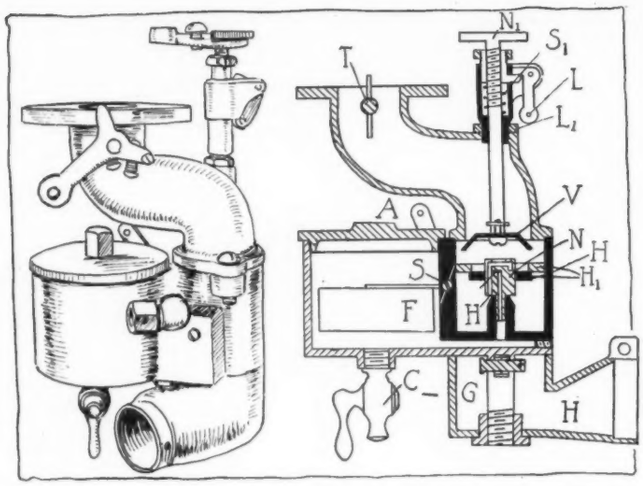


Fig. 3—Fosnacht reseater. Fig. 4—Blitzen decarbonizer



Figs. 5 and 6—View and section of Raymond automatic carbureter

Positive Portable Steam Vulcanizer—A new departure in steam vulcanizers is the portable type, Fig. 7, which is known as the Positive, being made by the Positive Tire Vulcanizer Co. In this device has been accomplished the problem of making steam not under pressure available for vulcanizing work, and this has been done in the following manner: The vulcanizer is made of one piece and contains a narrow section for water and a wide section for gasoline, with four ribs running all across the device. The water is filled into W and fuel into the compartment F, and the maker advises that pure water from the tank of the car be used. As for fuel, alcohol may, of course, be used, but gasoline is preferable. The capacities of the tanks are such that the process will take 20 minutes after lighting the fuel, after which the casing or tube is left to cool and is ready for work. The manner of attaching the vulcanizer, if a casing is to be repaired, is here shown. For tube repairs, the tube is either placed across a casing and the vulcanizer on top of it, or a special convex piece is used, which is furnished with the vulcanizer and fits the convex surface, so that the tube can be placed between the two. The factory of the maker is in Davenport, Ia.

Vacumit Tire Filler—A new tire filler, Vacumit, Fig. 10, which is made by the Vacumit Co. of America, 1777 Broadway, New York City, has just been placed on the market, after extensive tests by the Imperial and Royal Technological Institute for Scientific Research of Vienna, Austria. The tests showed that 10,000 miles of travel in all sorts of weather, temperature and road conditions did not alter the constitution or riding quality of Vacumit. The same is light olive green and a tight, homogeneous substance, alike to light-cured rubber in consistency and highly elastic. At a temperature of 284 deg. Fahrenheit it is neither chemically altered nor combustible, so that it is for all practical purposes inert to heat. It is shaped in molds by the manufacturer and is solid when placed in the casing from which it is separated by a fabric container surrounding the filler on all sides. It is very easy riding and after having been installed gives no trouble whatever.

Hess Holdfast Match Safe—Hess & Son, 1031 Chestnut street, Philadelphia, Pa., have placed on the market the Holdfast match safe, Figs. 8, 9, 11 and 12. This simple and low-priced device is attached to the dashboard and serves for keeping the matchbox, this handy and often necessary touring accessory, in one place, from which it cannot be removed except if definitely desired, and which is so constructed that the match box is open and the matches are always ready, but cannot fall out of the safe. As the illustrations show, the device is a brass plate, several inches long, which is secured to the dashboard by a screw and to which two double spikes and a jointed member suited for fitting into the outer box section are attached. To put the match box in place on the safe, a spring in the side of the attachment is raised and the jointed section drops to the front, whereupon the outer half of the match box is fitted over it, the inner half with the matches protruding from the outer. Then the section is put back in its original position and the spikes fixed to the brass plate pass through the back of the box and hold it securely in place. The only way of releasing the matchbox from the safe is by breaking the empty box off the spikes, pressing up the spring and then removing the remainders of the outer half of the box from the jointed section.

Stellite Alloy for Tools—Elwood Haynes, Kokomo, one of the earliest makers of automobiles in America, has during the past few years spent his time in perfecting an invention made as early as 1899 and consisting of a substitute of steel for the purpose in tools of all sorts. The new metal is known as stellite, as, when polished, it is of untarnishable brilliance, hence the reference to the stellar property. The name has, however, nothing to do with steel, as the alloy contains no iron whatever. The metal is very tough and cold malleable, but is forgeable at bright red heat. In this state it can be fashioned into lathe tools, which are claimed to be superior to high-speed steel due to greater mechanical qualities and also a much lesser tendency to heat in high-speed work. This has been shown in tests made by the maker in lathe and drilling work.

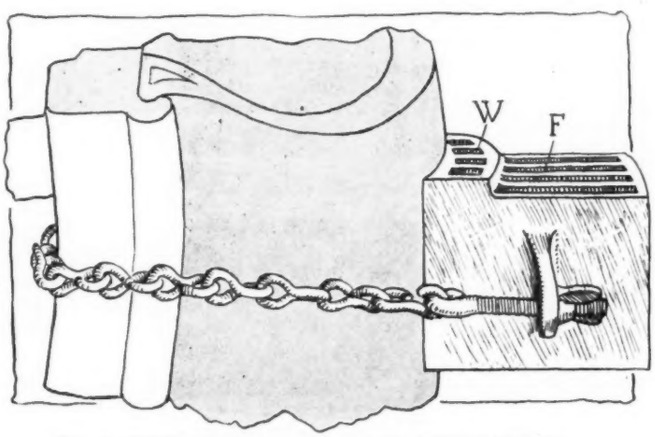
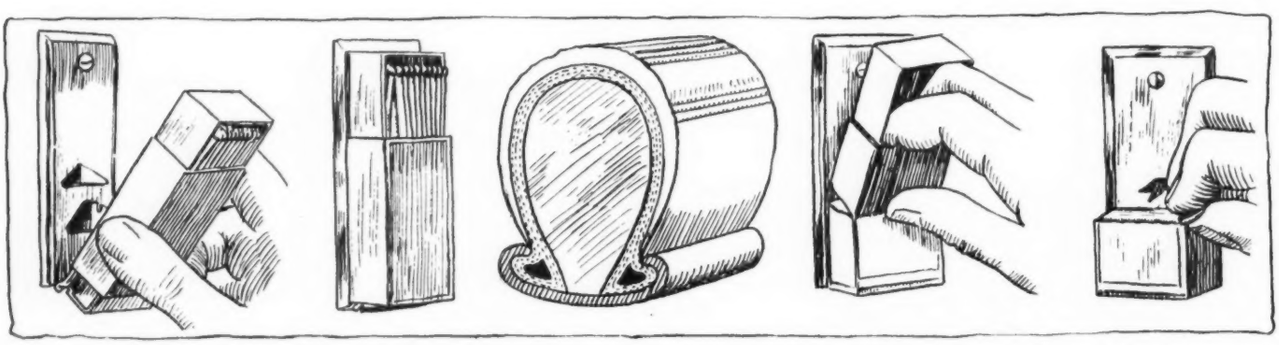


Fig. 7—Positive portable non-pressure steam vulcanizer

Dandy Silver-Plating Outfit—Woodward & Son, Toledo, O., have brought out an electric-plating outfit, which may be operated by dry cells and does not require the removal of the object to be plated from the car. The terminals of the outfit are connected to the dry cells or storage battery, whichever is used, and a brush connected to these terminals is immersed in a solution and then rubbed over the objects to be plated. The maker claims that metal rubbed thus with this brush is plated



Figs. 8, 9, 11 and 12—Holdfast match safe for automobiles. Fig. 10—Section through a casing filled with Vacumit